ABSTRACT

Title of Dissertation: A QUASI-EXPERIMENTAL EVALUATION OF READING AND SPECIAL EDUCATION OUTCOMES FOR ENGLISH LANGUAGE LEARNERS IN INSTRUCTIONAL CONSULTATION TEAMS SCHOOLS

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The present quasi-experimental study used hierarchical linear modeling (HLM) to investigate whether the Instructional Consultation (IC) Team model differentially influences fourth and fifth grade state reading achievement test scores, and English Language Learner (ELL) student scores in particular. Correlations among student-, classroom-, and school-level variables and special education placement were also explored using HLM. Archival data from 11 IC Teams "treatment" schools and 17 nonequivalent "control" schools in a mid-Atlantic state were analyzed in both students-within-schools and classrooms-within-schools multilevel models, with appropriate controls specified for classroom and school compositional effects. Although students-within-schools HLM models of reading achievement were not significant, classrooms-within-schools models indicated that classrooms in IC Teams schools had significantly higher class average reading achievement test scores (ES = .36) compared to classrooms in control schools. Neither the students-within-schools nor classrooms-within-schools

HLM models found IC Teams to differentially influence reading achievement for ELL students. In addition, classrooms-within-schools results indicate that classrooms in general and classrooms with higher percentages of ELL students tended to have lower percentages of students placed in special education in IC Teams schools. The presence of significant effects at the classroom level may indicate that the classroom is a better unit of analysis for investigating the effectiveness of the IC Team model during the first two to three years of implementation, when its greatest impact may be on teacher, as opposed to student, improvement. Despite its limitations, the present study represents the most rigorous investigation of the effect of IC Teams on student reading achievement to date, and serves as a foundation for future research using HLM to investigate the effects of the IC Team model on student and classroom outcomes.

A QUASI-EXPERIMENTAL EVALUATION OF READING AND SPECIAL EDUCATION OUTCOMES FOR ENGLISH LANGUAGE LEARNERS IN INSTRUCTIONAL CONSULTATION TEAMS SCHOOLS

by

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Dissertation submitted to the Faculty of the Graduate School of the University of Maryland, College Park in partial fulfillment of the requirements for the degree of Doctor of Philosophy
2007

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CHAPTER 1

INTRODUCTION

Context

Meeting the educational needs of America's estimated 12% English Language Learner (ELL) elementary school students is a major challenge facing schools today (e.g., Kindler, 2002; Ovando, Collier, & Combs, 2003). These students are academically disadvantaged because they have difficulty speaking, reading, or writing the English language at age- and grade-appropriate levels (Bilingual Education Act, 1994). ELL students are typically not achieving as well as their non-ELL peers, who tend to have higher test scores, grades, and high school graduation rates (e.g., McCardle et al., 2005; Meece & Kurtz-Costes, 2001).

Researchers and advocacy groups have also documented disproportionate representation of ELL and minority students in special education (e.g., Artiles, Rueda, Salazar, & Higareda, 2002; Council for Exceptional Children & National Alliance of Black School Educators, 2002; Pérez & Skiba, 2006). Over-representation of ELLs has been found in the disability categories of Speech/Language Impairment, Mental Retardation, and Emotional Disturbance, suggesting that many ELLs may fail in general education (McCardle et al., 2005). One potential indicator of ELL student success in general education, therefore, would be a corresponding decrease in special education referrals for these students.

Placement of ELL students in special education can also be problematic because the effectiveness of traditional special education has been questioned, with calls for reform (Algozzine, Christenson & Ysseldyke, 1982; Gersten, Brengelman & Jiménez, 1994; Kavale & Forness, 1999; Reynolds, Wang & Walberg, 1987; Ysseldyke, Vanderwood, & Shriner, 1997). The literature suggests factors that can improve the effectiveness of special education placement, including emphasizing instructional versus intra-individual variables and ensuring that the right children are receiving these services (e.g., Kavale & Forness, 1999). When a disability label is assigned to a non-disabled child, negative academic, vocational, and socio-emotional outcomes can result (CEC & NABSE, 2002; Harry & Anderson, 1994).

ELLs are typically referred to special education in the early elementary grades for reading and behavioral problems (Ochoa, Robles-Piña, Garcia, & Breunig, 1996) and speech/language concerns (Silva, 2005). Gender appears to be an important variable, with one study finding that Hispanic boys are referred to special education more often than Hispanic girls (Rueda, 1985). There is evidence that few interventions are tried with ELL students prior to special education referral (Rodriguez & Carrasquillo, 1997), and that ELL students are less likely to be referred to prereferral and early intervention teams (Silva, 2005). Once ELL students are referred for special education evaluation, they are more likely to be evaluated and found eligible compared to their non-ELL peers (Silva, 2005).

The literature reveals several factors, in addition to limited English proficiency, that may contribute to poor ELL academic outcomes in general education. These factors include poor instructional quality (e.g., Ortiz & Yates, 1986; Silva, Hook, & Sheppard, 2005), teachers' lack of knowledge about language development (e.g., Cummins, 1999; de Valenzuela & Niccolai, 2004), inaccurate assessment methods (e.g. Solano-Flores & Trumbull, 2003), disregard for cultural differences (e.g., Heath, 1983; Ortiz &

Maldonado-Colon, 1986), school personnel bias (e.g., Elhoweris, Mutua, Alsheikh, & Holloway, 2005), and low socioeconomic family status (e.g., Burkam, Ready, Lee, & LoGerfo, 2004; Donovan & Cross, 2002). School composition, including ethnicity and SES characteristics of students, has also been shown to influence student achievement (Mosteller & Moynihan, 1972; Willms, 1986). Finally, overall school achievement levels can affect individual student achievement (e.g., Willms, 1985).

To improve ELL achievement outcomes, a variety of educational approaches have been suggested, including provision of effective instruction, early identification and intervention of academic difficulties, provision of reading interventions designed for at-risk ELLs, and implementation of prereferral and early intervention teams. The first approach concerns the provision of effective instruction in general education. The report of the National Reading Panel (NRP) defines evidence-based English reading instruction for all students as instruction in phonemic awareness, phonics, fluency, vocabulary and comprehension, and early literacy skills (National Institute of Child Health and Human Development, 2000). According to the Individuals with Disabilities Education Improvement Act (IDEA; 2004), these guidelines must be considered before a child is found eligible for special education via either a Response to Intervention (RtI) process or a traditional eligibility determination model (Batsche et al., 2005; IDEA, 2004). There is also a growing literature on suggested practices for effective instruction of ELL students, emphasizing a culturally responsive curriculum that balances basic and higher-order skills, clinical teaching, explicit skills instruction, opportunities for language use, student-directed activities, and practice opportunities (e.g., August & Hakuta, 1997; Ortiz, Wilkinson, Robertson-Courtney, & Kushner, 2006).

With the reauthorization of IDEA (2004) and resulting support for RtI, early identification and intervention approaches, which frame problems as instructional and environmental constructs, have been suggested as effective for at-risk students (e.g., Batsche et al., 2005). Although the NRP guidelines were not developed specifically for at-risk ELL students, the National Literacy Panel on Language-Minority Children and Youth found that instruction in the same key components of reading for native English speakers are important for developing literacy in ELL students, along with an emphasis on English oral language development (August & Shanahan, 2006). Initial research also suggests that RtI is an effective model for addressing ELL students who are at risk for reading problems (Linan-Thompson et al., 2006).

The growing literature on effective reading intervention for at-risk ELL students suggests that regular explicit instruction conducted in English or Spanish on phonemic awareness, letter knowledge, word recognition, connected text fluency, comprehension, oral expression, and vocabulary development significantly improves reading skills (Vaughn et al, 2006a, 2006b, 2006c). Experimental designs have also documented the effectiveness of vocabulary instruction, error correction, and fluency building on ELL oral reading rate and comprehension (Tam, Heward & Heng, 2006), time-delay taped words intervention on ELL sight word knowledge (Bliss, Skinner & Adams, 2006), and peer-assisted learning strategies on reading comprehension (Sáenz, Fuchs, & Fuchs, 2005). In addition, phonological awareness and decoding have emerged as important for improved oral fluency and word identification outcomes among ELL students (Denton, Anthony, Parker, & Hasbrouck, 2004; Gunn, Biglan, Smolkowski, & Ary, 2000; Gunn, Smolkowski, Biglan, & Black, 2002). Finally, the literature suggests several approaches to literacy instruction for ELLs in addition to what is considered effective reading instruction for all students, including instruction in oral English proficiency (August & Shanahan, 2006) and the merging of English-language development with content instruction (Gersten & Baker, 2000).

Finally, a variety of prereferral and early intervention team (PEIT) models have been developed and implemented in public schools with desired outcomes, including reduction in the number of special education referrals and increases in student performance and teacher satisfaction (e.g., Burns & Symington, 2002; Gravois & Rosenfield, 2002, 2006). PEIT models typically follow a problem-solving process (including request for consultation, consultation-observation, conference), and, if needed, formal referral to special education. Consistent with IDEA 2004, PEIT models can document the absence of effective instruction and support teachers in developing more effective classroom practices (Gravois & Rosenfield, 2002; Ortiz, Wilkinson, Robertson-Courtney, & Kushner, 2006).

While PEIT models have not been developed specifically for ethnic minorities, implementing Instructional Consultation (IC) Teams (Gravois & Rosenfield, 2002; Gravois & Rosenfield, 2006), Mainstream Assistance Teams (Fuchs, Fuchs & Bahr, 1990), Project Achieve (Knoff & Batsche, 1995), and Teacher Assistance Teams (Bay, Bryan & O'Connor, 1994) in ethnically diverse schools has resulted in an overall decrease in special education referrals. IC Teams have also been documented as more effective than other existing PEIT models in decreasing the special education referrals of ELL students (Silva & Rosenfield, 2004; Silva, 2005).

The Assessment and Intervention Model for the Bilingual Exceptional Student (AIM for the BESt) process includes one of the only PEIT models developed specifically for ELLs (Ortiz, Wilkinson, Robertson-Courtney & Bergman, 1991). This team works to determine the most effective intervention to meet the ELL student's needs and develops a plan to help the teacher resolve the problem. Use of the AIM for the BESt teams were found to resolve problems without referral to special education in 73% of the cases considered over a two-year implementation period. Unfortunately, this model has not been implemented anywhere else since 1991 (M. Kushner, personal communication, September, 2003).

The IC Team model, while not developed specifically for ELL students, has been recommended as a preventative delivery system for supporting teachers of ELL students (Lopez & Truesdell, 2007). The IC Team model is a consultee-centered, teacher support PEIT model that engages in a formalized, data-based problem-solving process to promote a match between the student, instruction, task, and environment (Rosenfield, 1987; Rosenfield & Gravois, 1996). A request for assistance to an IC Team is viewed as an opportunity for the teacher to engage in a professional consultation relationship that can increase his or her competency to deliver appropriate instruction.

A consultee-centered consultation model such as IC Teams can be particularly effective for supporting teachers of ELL students, since the majority of educators have not received training in instructing this population (McCardle et al., 2005). The IC Team model incorporates principles that have been implicated as being effective for ELL students, including building on student prior knowledge, using collaborative problem-solving and curriculum-based assessment, providing supports to teachers, examining the curriculum, and using appropriate instructional strategies (Burnette, 1998; Echevarria & Graves 1998; Gersten, Brengelman & Jiménez, 1994; Ortiz, 1997; Ortiz & Kushner 1997; Rodriguez & Carrasquillo, 1997; Warger & Burnette, 2000). The IC Team model further stands out as a potentially effective instructional approach for ELL students because it is based on best practices for PEITs (Iverson, 2002, Kovaleski, 2002, Rosenfield & Gravois, 1996) and incorporates all the indicators of quality prereferral interventions (Flugum & Reschly, 1994). Finally, teachers who request assistance from the IC Team may have an easier time handling the needs of a diverse class and using differentiated instruction. However, it should be noted that some of the specific strategies for instructing ELLs have not been directly incorporated into the IC Teams training.

Statement of the Problem

Early intervention of academic difficulties and provision of teacher support appears to be particularly important for ELL students, who often have poor academic outcomes (e.g., Meece & Kurtz-Costes, 2001) and may be disproportionately represented in special education (e.g., McCardle et al., 2005). Ineffective instructional environments (e.g., Arreaga-Mayer & Perdomo-Rivera, 1996; Silva, Hook, & Sheppard; 2005) and delayed intervention (e.g., Batsche et al., 2005) are considered to be contributing factors to increased special education referrals and poor academic outcomes of ELL students.

Implementation of the IC Team model has been associated with improved academic outcomes for all students (Gravois & Rosenfield, 2002), decreased disproportionate evaluation and placement of minority students in special education (Gravois & Rosenfield, 2006), and decreased special education referral and placement rates for ELL students compared to existing PEIT teams (Silva, 2005). However, with the exception of one study on special education outcomes for ELL students (Silva, 2005), the IC Team model has not been evaluated in terms of its impact on the reading achievement and special education placement of ELL students. In addition, IC Teams, which impact students and teachers who are nested within schools, have never been experimentally evaluated using appropriate statistical methods for investigating school effects within educational contexts.

The purpose of this study is to investigate the effects of the IC Team model on the reading achievement and special education placement of ELL students. Even though it is not possible to assess the validity of the placements in special education, special education placement is important to consider because it serves as a marker variable for the effectiveness of any early intervention model, including the IC Team model, in general education. Specifically, if IC Teams are effective, special education placement rates may decrease, because teachers are more likely to be able to address the instructional needs of their students in general education. However, the use of special education as a marker variable can be problematic, because there may be other reasons why special education referrals decrease when a PEIT model is implemented.

The literature describes several demographic variables that may contribute to suboptimal student outcomes in general education. As a result, the following predictor variables were included in hierarchical linear modeling equations: ELL student status (e.g., Bilingual Education Act, 1994; CEC & NABSE, 2002; McCardle et al., 2005; Meece & Kurtz-Costes, 2001), ethnicity (e.g., Donovan & Cross, 2002), gender (e.g., Lloyd, Kauffman, Landrum, & Roe, 1991; Rueda, 1985), SES (Entwisle & Alexander, 1992; Burkam et al., 2004), school SES and ethnic composition (e.g., Mosteller &

Moynihan, 1972; Willms, 1986), and overall school achievement (e.g., Willms, 1985). Grade levels and prior reading achievement scores were also be included as predictor variables. Study results have implications for the use of IC Teams and other PEIT models to address the needs of ELL students, as well as the development of service delivery for this population.

Research Questions

1. Does the IC Team model improve the reading achievement of students (in grades 4 and 5)?
2. Does the IC Team model differentially influence reading achievement for ELL students (in grades 4 and 5)?
3. Does the IC Team model decrease special education placement of students (in grades 4 and 5)?
4. Does the IC Team model differentially influence special education placement for ELL students (in grades 4 and 5)?

Definition of Terms

English language learner (ELL). A language-minority person who has difficulty understanding, speaking, reading, or writing the English language at a level appropriate to his or her age and grade (Bilingual Education Act, 1994). An ELL student in the mid-Atlantic state where this study took place is classified according to Public Law 107-110, which includes that such English language difficulties are sufficient such that they deny the individual “the ability to meet the State’s proficient level of achievement on State assessments…; the ability to achieve successfully in classrooms where the language of instruction is in English; or the opportunity to participate fully in society" (Board of Education, Commonwealth of Virginia, 2002).

In this mid-Atlantic state, ELL students are categorized according to four levels of English language proficiency (fully described in Board of Education, Commonwealth of Virginia, 2002). At level 1, ELLs can comprehend simple statements and questions, read basic material, and compose short passages on familiar topics. At level 2, ELLs can comprehend short conversations on simple topics, read basic narrative text, and write simple notes and reports. Level 3 ELLs can understand standard speech in most settings with some repetition, can read many texts independently, and can write multi-paragraph compositions. Finally, level 4 ELLs can understand most standard speech, read and obtain meaning from a wide range of texts, and write fluently. In the present study, ELL proficiency levels were not known.

Instructional Consultation (IC) Team model. A teacher support early intervention team model that uses a formalized data-based, decision making process to address teacher concerns within the general education classroom. In response to voluntary requests for assistance, IC Team members, functioning as consultants, provide support to teachers by ensuring that students are well-matched to their instructional environments and tasks. IC Team members include administrators, general and special educations, school psychologists, school counselors, health care providers, and social workers (Rosenfield & Gravois, 1996).

Reading achievement. A student's ability to use word analysis strategies and information resources and demonstrate comprehension of written text, as measured by the Virginia Standards of Learning (SOL) assessments in Reading (Virginia State

Department of Education, 2005a, b). The SOL assessments have been used annually to measure student progress on the Virginia Standards of Learning since 1998 (Thayer, 2000).

Special education placement. A decision to qualify a student for special education services, made by a legally mandated team responsible for evaluating, identifying, and documenting students with disabilities, developing and re-evaluating individual education plans for students with disabilities, and determining appropriate placements for these students (IDEA 2004; IDEA 1997).

CHAPTER 2

REVIEW OF LITERATURE

Overview

The purpose of this chapter is to review the literature relevant to this study of reading achievement and special education placement outcomes for English language learner (ELL) students in Instructional Consultation (IC) Teams schools. This chapter will begin with a description of the ELL public school population, including concerns about the academic achievement and special education representation of this population.

Hypotheses for poor general education outcomes of ELL students will be presented, along with possible classroom-based approaches to these problems. The focus will then turn to prereferral and early intervention team models and best practices, with particular emphasis on those that have documented positive outcomes for culturally and linguistically diverse (CLD) students, a category which includes ELL students. Finally, the IC Team model will be reviewed in detail, including impact on outcomes for ELL students.

Prevalence and Definition of English Language Learners

America is increasingly culturally and linguistically diverse. According to the 2000 U.S. Census, 12.6% of the population is Hispanic/Latino and 12.7% is Black/African American. Population projections predict that Hispanics will comprise nearly 25% of the United Stated population by 2050 (U.S. Census Bureau, 2004). Approximately 25-42% of the population in Arizona, California, New Mexico, and Texas is already Hispanic. Furthermore, 17.9% of the U.S. population (five years old and older) speaks a language other than English at home, and approximately 11% of the population is foreign born.

These population effects are being felt by our public education system. In 2000-2001 alone, ELLs comprised nearly 10% of total Pre-Kindergarten through twelfth grade nationwide public school enrollment, including an ELL population of nearly 12% in Pre-Kindergarten through sixth grade (Kindler, 2002). While ELLs represent more than 460 language groups nationwide, approximately 80% of the ELL student population is Spanish speaking. On a local level, a 2002 Virginia State Department of Education survey of Virginia public schools indicated that 49,840 of the students in Pre-Kindergarten through twelfth grade were classified as being limited-English-proficient (LEP), representing a three-fold increase in this category compared to the 1992 student population (Virginia Department of Education, 2002).

The term *limited-English-proficient* refers to a language-minority person who has difficulty understanding, speaking, reading, or writing the English language at a level appropriate to his or her age and grade and is, thereby, academically disadvantaged in programs conducted exclusively in English (Bilingual Education Act, 1994). ELL students have a wide range of native language skills, which, if nurtured, can assist with their acquisition of English. The ELL and LEP categories are often used interchangeably and will be treated as such for the purposes of this review.

ELL students are identified using a variety of methods, including parental information (for example, home language), teacher observations, teacher interview, student records and grades, and tests (Kindler, 2002). Language proficiency, achievement, and criterion referenced tests are the most commonly used for this purpose.

ELL students are usually referred to English as a Second Language (ESL) services based on their ability to perform ordinary classroom work. ESL classrooms are typically pull-out programs where students receive support to develop conversational English skills (Kushner & Ortiz, 2000, March). Students in these classrooms generally represent a variety of language groups, and although the curricular goals vary, instruction is in English (Cloud, 1990). The goal of ESL is to return students to the mainstream classroom on a full-time basis as soon as they are reclassified as English proficient. ESL exit requirements vary, but generally include tests measuring English proficiency.

ELL and LEP students are a particularly compelling population in the schools, because they are not achieving as well as their peers. The literature shows that culturally and linguistically diverse (CLD) students, a category that includes ELL students, tend to have lower test scores, grades, and high school graduation rates, and higher retention, suspension, and expulsion rates (McCardle et al., 2005; Meece & Kurtz-Costes, 2001). In addition, there is an extensive literature on the disproportionate representation of CLD students in special education (e.g., Artiles, Rueda, Salazar & Higareda, 2002; CEC & NABSE, 2002). In spite of these concerns, the majority of general and special education teachers who teach ELL students report receiving little training on the instruction of this student population (Ovando, Collier, & Combs, 2003).

CLD and ELL Students and Special Education

ELL students who experience difficulty in the classroom despite receiving ESL services are typically referred to special education via Individualized Education Program (IEP) Teams, which are legally mandated (IDEA 1997; 2004). However, special education prevalence data and research suggests disproportionate representation of ELLs and minorities in special education (Artiles et al., 2002; CEC & NABSE, 2002; Garcia & Ortiz, 1988; Harry & Anderson, 1994; Heller, Holtzman, & Messick, 1982; Jitendra & Rohena-Diaz, 1996; Gersten, Brengelman & Jiménez, 1994; Klingner, Artiles, & Barletta, 2006; McCardle et al., 2005; Olson, 1991, March; Ortiz & Kushner, 1997; Ortiz & Maldonado-Colón, 1986; Ortiz & Yates, 1984; Pérez & Skiba, 2006; Valles, 1998). Over-representation occurs when members of a particular ethnic or linguistic group are repeatedly referred and inappropriately placed in special education, causing that group's membership in special education to be larger than the percentage of that group in the general educational system (CEC & NABSE, 2002).

The issue of over-representation of minorities in special education is not new, dating back to a 1968 article by Dunn that characterized the educable mentally retarded population as being 60 to 80 percent African-American, American Indian, Mexican, Puerto Rican, and from non-middle class environments (as cited by MacMillan & Reschly, 1998). More recent figures suggest that African American youth, who account for approximately 15% of the population, account for over 20% of the special education population, and are nearly three times as likely as white students to be labeled mentally retarded (CEC & NABSE, 2002). African Americans may be over-represented as a result of inaccurate identification methods, lack of access to effective instruction, and failure of the general education system to educate children from diverse backgrounds (CEC & NABSE, 2002; Harry & Anderson, 1994).

Perhaps as a result of the ever-increasing linguistic diversity among today's public school students, disproportionality advocacy has begun to include ELL students, whose over-representation prevalence data vary by state. In Texas, research has revealed a 300% over-representation of Hispanics in the "learning disabled" category; however, it is unclear how many Hispanics are ELLs (Ortiz & Yates, 1983). In California, ELLs from urban school districts were 27% more likely than English-proficient students to be placed in special education in elementary grades and twice as likely as English-proficient students to be placed in secondary grades (Artiles, Rueda, Salazar & Higareda, 2002). Furthermore, ELLs in secondary grades were more than three times as likely to be identified as Mentally Retarded and 38% more likely to be identified as having Speech/Language Impairment compared to their English-proficient peers.

Some researchers also point to possible under-representation of ELLs in special education, arguing that students who have legitimate disabilities are being deprived of appropriate services (Harry, Klingner, Sturges & Moore, 2002; Olson, 1991; Ortiz & Kushner, 1997). Although McCardle et al. (2005) cite national data showing under-representation of ELL students overall in special education, these researchers also point to over-representation in the disability categories of Speech/Language Impairment, Mental Retardation, and Emotional Disturbance.

Regardless of the data source and how disproportionality is measured, it is clear that there are significant concerns regarding ELLs and special education referral rates. In 1998, the U.S. Office of Special Education Programs (OSEP) and the U.S. Office for Civil Rights (OCR) documented three concerns about disproportionate representation of minorities: students may be unserved or receive services that do not meet their needs; students may be misclassified or inappropriately labeled; and placement in special education classes may be a form of discrimination (Burnette, 1998). Nearly a decade later, psychologists and educators continue to struggle with these issues (e.g., Rhodes, Ochoa, & Ortiz, 2005). When viewed as a public right to services with inevitable resource constraints, it becomes important that the children served in special education be those who are truly educationally disabled and in need of the additional time and instructional intensity that special education can deliver.

Implications of Special Education Placement

Placing students in special education has important implications for their long-term outcomes. Evidence suggests that referral to special education may lead to stigma and non-beneficial outcomes for many students, including decreased self-image (Kavale & Forness, 1999; Dunn, 1968, as cited in Valles, 1998). Wilkinson and Ortiz (1986) found that after three years in special education placement, Hispanic students who were classified as learning disabled showed significantly lower verbal and full scale Wechsler Intelligence Scale for Children - Revised IQ scores and unchanged Woodcock-Johnson achievement scores compared to their initial entrance scores. Although the researchers were unable to verify whether these children were appropriately placed in special education, this finding suggests that special education may not produce desired results for Hispanic and ELL children.

In addition, the effectiveness of special education has been increasingly questioned, with calls for reform (Algozzine, Christenson & Ysseldyke, 1982; Gersten, Brengelman & Jiménez, 1994; Kavale & Forness, 1999; Reynolds, Wang & Walberg, 1987; Ysseldyke, Vanderwood, & Shriner, 1997). A research review conducted by Reynolds, Wang and Walberg (1987) found several problems with special education, including lack of consistency and validity in defining the categories used in research and practice. The authors propose the use of prereferral interventions to limit special education assessments, the use of curriculum-based assessment procedures to ensure appropriate educational programming, and the reallocation of special education resources to facilitate the provision of effective services in regular classrooms.

Meta-analyses reviewed by Kavale and Forness (1999) found that six prominent interventions used in *special* education, including psycholinguistic training, psychotropic medication, social skills training, modality instruction, perceptual-motor training, and the Feingold diet had effect sizes of less than .50, representing less advantage than one-half year's worth of schooling. The authors also state their concern that special education teachers vary widely in terms of implementing components of effective instruction. Kavele and Forness (1999) also identified several special *education* interventions that had large effects (e.g., .80 and above), including direct instruction, behavior modification, reading comprehension, and mnemonic strategies. Unfortunately, Kavale and Forness (1999) do not describe how any of the interventions were actually represented in practice, and how studies were chosen for inclusion in the meta-analysis, raising concerns about construct validity. While research-based instructional practice could improve special education, the lack of specificity for proper implementation hinders effective practice.

Reviewed as a whole, the literature suggests factors that can impact the effectiveness of special education placement, including emphasizing instructional versus intra-individual variables and ensuring that the right children are receiving these services. The very existence of special education and the accompanying discussions about disproportionate representation of ELL students also suggests that some non-disabled ELL students may be failing in general education settings. Therefore, one potential indicator of ELL student success in general education would be a corresponding decrease in special education referrals for these students.

ELL Referral Concerns

Studies have investigated the reasons why ELL and CLD students are typically referred to special education. A survey of National Association of School Psychologists (NASP) members from states with high Hispanic populations found that CLD students were most often referred for poor achievement, reading problems, and behavioral problems (Ochoa, Robles-Piña, Garcia, & Breunig, 1996). Results indicated that between 70% and 91% of the respondents' schools used a prereferral committee when addressing a CLD student referral. However, only 52% of respondents indicated that these prereferral committees included a bilingual education representative. The authors call for future research on school and systemic factors, including effectiveness of prereferral interventions with CLD students. While these findings do not address ELL students specifically, it is likely that many of the Hispanic CLD students were also ELL students.

These findings are similar to an earlier study of referred Kindergarten through twelfth grade Hispanic students in four large urban school districts (n = 1,319), which found that the majority of the referrals were for low academic achievement and reading problems (Rueda, 1985). In addition, most referrals were in the early elementary grades, were male, and had a Spanish language background, yet only a fifth of the sample had been in ESL or bilingual classes prior to referral. More than half of the sample (63%) was eventually classified as learning disabled.

A study of the referral process of 46 Hispanic LEP students in a New York City public school also found that the most common reason for referral was overall academic deficits; 73% of the students were classified as Learning Disabled and 15% were labeled as Speech Impaired (Rodriguez & Carrasquillo, 1997). However, results showed that few interventions were tried with the students prior to special education referral, despite the fact that 63% of the students had been in the U.S. for less than three years. Review of the students' records suggested that no interventions had been tried with 43% of the students. In addition, out of the 26 students who did receive some type of intervention, only three had records noting the length of time of the services provided. Clearly, effective intervention in general education is indicated to reduce LEP over-representation in special education. In addition, the authors recommend using curriculum-based scales and checklists to provide information about the LEP student's abilities.

Silva (2005) also examined the referral patterns of ELL elementary school students. Results indicated that ELL students were more likely to be initially referred to IEP Teams in the lower grades (especially Kindergarten), and that grade level was not a significant factor for non-ELL students initially referred to IEP Teams. Although the Silva (2005) study found that gender did not predict ELL student referrals to special education, other research has found that Hispanic boys (Rueda, 1985) and boys in general (Lloyd, Kauffman, Landrum, & Roe, 1991) are referred to special education more often than girls. In addition, ELL students with speech/language concerns were more likely to be initially referred to IEP Teams, and less likely to be initially referred to IC Teams (Silva, 2005).

The findings that ELL students, particularly Kindergartners and those with speech/language concerns, are less likely to be initially referred to existing prereferral and early intervention teams instead of IEP Teams suggests that general education teachers may not feel prepared to respond effectively to the needs of the ELL population. One training approach might be to offer professional development opportunities relating to ELL issues, such as the language acquisition process and the distinction between difficulties relating to being an English learner versus those related to a speech/language disability. Teachers should also be supported as they optimize instruction for these students.

Silva (2005) also found that the majority of all cases initially referred to IEP or prereferral and early intervention teams other than IC Teams were evaluated for special education eligibility and found eligible for special education. ELL students ultimately referred to IEP Teams were more likely to be evaluated and found eligible for special education compared to non-ELLs. This finding is consistent with the literature on over-representation of ELL students in special education (e.g., Artiles, Rueda, Salazar & Higareda, 2002; Ortiz & Yates, 1983), and underscores the importance of addressing factors which may lead to inaccurate ELL referrals, such as the impact of second language acquisition on student achievement and the quality of instruction in the general education classroom.

Hypotheses for Poor ELL Student General Education Outcomes

Several reasons have been proposed to explain the academic difficulties and resulting special education referrals characteristic of the ELL student population compared to their monolingual English peers, including quality of instruction, lack of knowledge about language development, inaccurate assessment methods, lack of sensitivity to cultural differences, school personnel bias, and student environmental risk factors. It is important to examine and address these possibilities, because once a student is referred to special education, the probabilities are high that he or she will be evaluated and placed (Algozzine, Christenson, & Ysseldyke, 1982; Ysseldyke, Vanderwood, & Shriner, 1997).

Quality of instruction. Heller, Holtzman and Messick (1982) suggest that disproportionate placement in special education occurs as a result of the quality of the instruction provided in the mainstream. Ortiz and Yates (1986) reach a similar conclusion, stating that "the mismatch between instructional needs of the language minority child and the general education system at this time destines many language minority students to a general lack of achievement, not necessarily indicative of a need or requirement for special education services" (p. 60).

Silva, Hook, and Sheppard (2005) used classroom observations to examine the instructional environments of two at-risk second grade ELL students throughout a four month period. Several deviations from best practice were found, including lack of coordination and communication among teachers and specialists, loss of academic engaged time (e.g., eight transitions in two hours), disregard for working memory limits and student instructional levels, lack of data-based decision making and goal setting, and the non-merging of English language development and academic content. Additional questionable practices, such as placing an emergent ELL student in the same reading group as two nonverbal autistic children, were also observed. Curriculum Based Assessments further found that the students had made limited reading progress within a three month period; one student had been unable to advance to the next reading benchmark level, and the other student had learned to identify only three new lower case and six upper case letters.

Arreaga-Mayer and Perdomo-Rivera (1996) made similar observations in their ecobehavioral analysis of regular and ESL elementary school classrooms for at-risk ELL students. The researchers used the Ecobehavioral System for the Contextual Recording of Interactional Bilingual Environments (ESCRIBE), which was developed to evaluate the instructional effectiveness of programs serving ELL students in diverse settings within schools. Arreaga-Mayer and Perdomo-Rivera found a pattern of minimal teacher attention to language development, such that ELL students were not given instruction that best facilitates second language acquisition. Instead, teachers emphasized lecture and whole-class formats, and students were not highly engaged in instructional activities. Ineffective instructional environments such as those observed by Silva, Hook, and Sheppard (2005, April) and Arreaga-Mayer and Perdomo-Rivera (1996) could contribute to poor academic achievement and increased special education referrals of ELL students. As stated by Rhodes, Ochoa, and Ortiz (2005), “the academic difficulties and/or underachievement of some LEP students could be pedagogically induced” (p. 30).

Lack of knowledge about language development. Second language acquisition, a complex process resulting from a variety of factors, can occur simultaneously (exposure to two languages from birth) or sequentially (exposure to a second language after three years of age; August & Hakuta, 1997; Ortiz & Kushner, 1997). Most ELLs are sequential bilinguals; those that are exposed to English in an additive environment, where favorable attitudes towards the student’s native language and culture exist, have an easier time learning English. Furthermore, research suggests that additive bilinguals exhibit cognitive advantages such as higher levels of concept formation, analytical reasoning, cognitive flexibility, selective attention, and metalinguistic skills (Berk, 2002; Ortiz & Kushner, 1997; de Valenzuela & Niccolai, 2004). In addition, ELLs with well-developed native language proficiency typically have an easier time acquiring English (de Valenzuela & Niccolai, 2004). Therefore, one hypothesis concerning the poor academic outcomes for ELL students is that educators are neither creating additive language environments nor supporting first language development.

Lack of consideration of the process of language development may also restrict ELL student access to support from ESL services. As they learn English, ELL students must develop two kinds of language skills: conversational English and academic, abstract English. The former, referred to as *basic interpersonal communication skills* (BICS), is a process which takes approximately two years (Cummins, 1999; Ortiz & Kushner, 1997). BICS includes the development of phonological skills, high-frequency vocabulary and grammatical constructs, and basic fluency typically used in oral language (de Valenzuela & Niccolai, 2004). ELLs usually master BICS with ease because conversation focuses on interesting topics, falls within students' experiential backgrounds, and is context-embedded (Ortiz & Kushner, 1997). However, mastering *cognitive academic language proficiency* (CALP), the higher level of abstract language used in academic learning tasks such as problem solving, evaluating, inferring, and acquiring new concepts, can take between 5 and 10 years. CALP includes the development of low-frequency vocabulary and grammatical constructs occurring more frequently in written text (de Valenzuela & Niccolai, 2004).

Research suggests that students are released from ESL services when they master BICS, or conversational English, (Cummins, 1999; Heisey & Robinette, 2002; Ortiz & Kushner, 1997). If ELLs are transitioned into a mainstream (non-ESL) class before mastering CALP, they are unlikely to receive needed instructional support in the promotion of second language academic skills (Cummins, 1999). Furthermore, mainstreamed ELLs who have not mastered CALP are forced to learn language and content at the same time, greatly hindering their academic achievement.

Inaccurate assessment methods. According to Solano-Flores and Trumbull (2003), "existing approaches to testing ELLs do not ensure equitable and valid outcomes because current research and practice assessment paradigms overlook the complex nature of language, including its interrelationship with culture" (p. 3). Problems with the identification process include testing that occurs primarily in English, inappropriate norms, biased content, product versus process orientation, misinterpretation of language problems as disabilities, failure to consider educational contextual and cultural variables, and failure to consider native language proficiency and second language acquisition (e.g., Barrera, 1995; Cummins, 1986; Hoover & Collier, 1985; Jitendra & Rohena-Diaz, 1996; E. Lopez, personal communication, July, 2003; Ortiz & Yates, 1984; Rhodes, Ochoa & Ortiz, 2005; Rodriguez & Carrasquillo, 1997; Solano-Flores & Trumbull, 2003). In addition, many school psychologists do not receive training on assessing CLD students (Ochoa, Rivera & Ford, 1997, as cited in Rhodes, Ochoa & Ortiz, 2005).

In a study designed to examine the accuracy of teacher assessments in screening for ELL reading disabilities, researchers found that teacher rating scales and nominations had low sensitivity in identifying ELL students at-risk for reading disabilities (Limbos & Geva, 2001). In addition, teachers inappropriately relied on student's oral language skills when screening ELL students for reading problems. Children who were not classified as at-risk by objective measures (e.g., standardized reading tests), but who demonstrated lower oral language proficiency teacher ratings, were inaccurately categorized as being at-risk.

Cultural differences. Cultural differences, in addition to language differences, may also play a factor in placing ELL students at-risk. Heath (1983) presents a compelling ethnographic account of how children's linguistic development differs between working-class white and working-class black communities, and compares academic outcomes of these children to their middle-class counterparts. Examples of important contextual variables include amount of time dedicated to reading to and interacting with the child; availability of toys and books in the home; learning by modeling versus direct instruction; and opportunities to answer and receive feedback on questions. Heath (1983) documented the significance of these varying patterns of language development for children's success in school. In particular, children from the black working-class communities failed early on in their academic careers, and children from the white working-class communities had success for several years first before eventually failing.

Other researchers have looked more carefully at the interactions between classroom and cultural variables. For example, Tharp (1989) reviews research noting that differences in classroom social organization, wait-time, instructional rhythm, and participation structures can impact CLD student learning. Greenfield (1997) also noted cultural differences in problem-solving, perception, organization of information, and performance on nonverbal tests. These types of cultural variables may be present for at-risk ELL students and should be carefully examined in the context of their classrooms.

Ortiz and Maldonado-Colon (1986) suggested that children are often referred to IEP Teams and special education as a result of behaviors related to linguistic proficiency that do not fit the expectation of educators. Placement committees then erroneously interpret linguistic, cultural, economic and other characteristics as deviant. For example, withdrawn, defensive, disorganized and aggressive behaviors resulting from cultural variability or occurring as a response to acquiring English can result in inappropriate referrals (Hoover & Collier, 1985). Furthermore, qualitative research has shown that school personnel's impressions of a child's family can directly influence placement decisions (Harry, Klingner, Sturges & Moore, 2002).

Bias. School personnel bias may also account for ELL over-representation in special education. There is a literature on teacher bias, subjective decision-making, and special education referrals in general (e.g., Foster, Algozzine, & Ysseldyke, 1980; Gottlieb, Gottlieb, & Trongone, 1991; Ysseldyke, Christenson, Pianta, & Algozzine, 1983). In addition, studies have documented that teachers are significantly more likely to rate black students as appropriate for special education compared to their white classmates (Bahr & Fuchs, 1991), and significantly more likely to refer students of unspecified ethnicity to gifted and talented programs compared to African American students (Elhoweris, Mutua, Alsheikh, & Holloway, 2005). Teachers have also been found to refer Mexican American students to special education more frequently than their European American classmates (Prieto & Zucker, 1981, as cited in Elhoweris et al., 2005).

Student environmental risk factors. Several environmental risk factors, which can produce negative developmental and cognitive outcomes, have been identified as particularly relevant for CLD children, a category which includes ELLs. These risk factors include low birth weight, exposure to alcohol, tobacco, and drugs during pregnancy, malnutrition, and exposure to lead (Donovan & Cross, 2002). Low parent socio-economic status (SES) is another important influence on CLD student achievement. Parents who raise children in poverty often face additional stressors, such as single-parent status, lack of resources, and exposure to stressful events, which can adversely impact parent-child relationships (Donovan & Cross, 2002). In addition, literacy skills as well as social and emotional skills have found to differ by SES among children entering Kindergarten (Donovan & Cross, 2002). School readiness gaps between children from low and high-SES families widen as children progress through school.

In a longitudinal, random sample of children starting first grade, Entwisle and Alexander (1992) found that mathematics achievement of African American and white students was nearly identical. Two years later, African American students had fallen behind. Differences in family SES were found to be the most important source of variation in mathematics achievement. These SES differences were particularly important during the summer months, when poor children lost the most ground compared to their more affluent peers. A 2004 study using a current and nationally representative sample of children confirmed these findings, showing that summer learning in literacy, mathematics, and general knowledge is related to family SES (Burkam, Ready, Lee, & LoGerfo, 2004). School composition, including ethnicity, SES characteristics, and achievement levels of students, has also been shown to impact individual student achievement (Mosteller & Moynihan, 1972; Willms; 1985; Willms, 1986).

Conclusion. Several hypotheses attempt to explain why ELL students may not be achieving as well as their peers in general education. By virtue of their linguistic minority status, ELL students are academically disadvantaged in programs conducted exclusively in English (e.g., Bilingual Education Act, 1994; CEC & NABSE, 2002; McCardle et al., 2005; Meece & Kurtz-Costes, 2001). In addition to taking into account ELL student status, the proposed study will consider the following variables that may be related to reading achievement and special education outcomes: ethnicity (e.g., Donovan & Cross, 2002), gender (e.g., Lloyd, Kauffman, Landrum, & Roe, 1991; Rueda, 1985), SES (Entwisle & Alexander, 1992; Burkam et al., 2004), and school SES, ethnic, and achievement composition (e.g., Mosteller & Moynihan, 1972; Willms, 1985; Willms, 1986). Prior reading achievement scores and special education status will also be considered as predictor variables.

Possible Approaches to Improve ELL Student Academic Outcomes

The literature suggests several approaches which may improve ELL achievement outcomes, starting with effective instruction in general education and early identification and intervention of difficulties. A growing research base has also begun to investigate effective reading interventions for at-risk ELL students. Finally, a variety of prereferral and early intervention teams have been developed to support teachers in addressing student concerns in general education.

Effective instruction. The report of the National Reading Panel (NRP; National Institute of Child Health and Human Development, 2000), which helped shaped the language of the No Child Left Behind Act of 2001 (NCLB), states that evidence-based reading instruction (in English) includes instruction in phonemic awareness, phonics, fluency, vocabulary and comprehension, and early literacy skills. The Individuals with Disabilities Education Improvement Act (IDEA; 2004), which states that lack of instruction must be considered when making special education eligibility decisions, means that a history of reading instruction adhering to the guidelines outlined in the NRP report must be present before a child is found eligible for special education (Batsche et al., 2005). As stated in the Executive Summary of the Report of the National Literacy Panel on Language-Minority Children and Youth, "…becoming literate in a second language depends on the quality of teaching…" (August & Shanahan, 2006 p. 3).

Although the NRP guidelines were not developed specifically for at-risk ELL students, the National Literacy Panel on Language-Minority Children and Youth found that instruction in the same key components of reading for native English speakers is important for developing literacy in ELL students, along with an emphasis on English oral language development (August & Shanahan, 2006). There is also a literature emphasizing a curriculum that balances basic and higher-order skills, explicit instruction, student-directed activities, use of native language and culture, and practice opportunities (August & Hakuta, 1997). It is also recommended that English grammar be taught alongside new academic content (Gersten & Baker, 2000). An emerging literature on effective vocabulary instruction for ELL students emphasizes the importance of taking advantage of similarities between the native language and English (particularly for Spanish-speaking students), practice and reinforcement, and explicit instruction in basic words that non-ELL students have already mastered (August, Carlo, Dressler, & Snow, 2005).

The literature further encourages teachers of ELL students to use a clinical teaching process in which alternatives such as varied instructional strategies (e.g., peer teaching, modeling of strategies, and cooperative learning) and teaching of necessary prerequisite skills are used to resolve academic and behavioral problems. Clinical teaching should also ensure that instruction focuses on the language demands of the classroom, the cultural knowledge needed in order to fully participate in the curriculum, and the cultural responsiveness of the materials used (Ortiz, Wilkinson, Robertson-Courtney, & Kushner, 2006). Finally, teachers should encourage goal setting, measure academic progress consistently, make directions clear, and clarify their expectations by drafting written agreements with students (Echevarria & Graves, 1998; Ortiz & Kushner, 1997).

Early identification and intervention. Traditionally, a context-based prereferral approach to examining the reasons for ELL achievement difficulty has been viewed as one way to achieve appropriate ELL special education referrals (Echevarria & Graves, 1998; Garcia & Ortiz, 1988; Ortiz & Kushner, 1997). This approach can include documentation of the following factors: appropriateness of the curriculum and assigned tasks, presence or absence of the difficulties in the native language, progress of the student relative to prior teaching, qualification of teacher to effectively teach language minority students, presence or absence of supportive yet challenging classroom environment, and quality and amount of instruction, including sequencing, continuity, and inclusion of prerequisite skills.

In recent years, there has been a significant push away from prereferral approaches that frame problems as internal child constructs and assume ultimate referrals to special education, to problem-solving and early intervention approaches, which frame problems as instructional and environmental constructs and identify interventions to resolve difficulties within the general education setting (Reschly & Ysseldyke, 2002). Although definition and implementation issues are present, Response to Intervention (RtI) is a promising approach. RtI involves the provision of high-quality instruction and intervention matched to student needs, along with progress-monitoring, to make important educational decisions (Batsche et al, 2005). Major research and policy reports have encouraged the use of RtI, including the National Institute for Child Health and Development Studies, National Reading Panel, National Research Council Panel on Minority Overrepresentation, National Summit on Learning Disabilities, and President's Commission on Excellence in Special Education (Batsche et al., 2005). In addition, the reauthorized Individuals with Disabilities Education Improvement Act (IDEA; 2004) allows local education authorities to use an RtI process when making special education eligibility determinations.

A three-tier model of service delivery is typically used in RtI, with Tier 1 consisting of high-quality instruction, group interventions, and screening for all students. For those approximately 20% of students who are determined to be at-risk, targeted, problem-solving interventions, such as those delivered by prereferral and early intervention teams or standard treatment protocols, are provided in addition to core instruction, at Tier 2. The third tier of the model consists of intensive, individual interventions, which can include those delivered in special education.

Initial studies investigating the use of RtI with ELL students are promising. Vaughn, Linan-Thompson, and Hickman (2003) found that when an RtI model was implemented, all fifteen ELL second graders at risk for reading problems were no longer at risk following 10 ($n = 6$), 20 ($n = 6$) or 30 ($n = 3$) weeks of supplemental reading instruction. Specifically, students received daily small-group instruction in fluency (5 minutes), phonemic awareness (5 minutes), instructional level reading (10 minutes), word analysis (10 minutes) and writing (3-5 minutes). Students appeared to benefit from instruction regardless of whether they were enrolled in a bilingual or ESL program.

Linan-Thompson, Vaughn, Prater, and Cirino (2006) provide one of the first experimental studies investigating the use of RtI with ELL students who are at-risk for reading difficulties in the fall of first grade. Approximately 100 at-risk ELL students from schools with either English only or English and Spanish instruction were randomly assigned to either RtI or control (e.g., typical) conditions. Students in the RtI condition received a daily supplemental reading intervention in either Spanish or English, and all students were assessed in the areas of letter-word identification, word attack, and passage comprehension at the end of first and second grades. At the end of first grade, more students in the RtI condition met the established benchmark criteria on their assessments compared to students in the control condition. This progress was still evident at the end of second grade, even after the intervention had stopped. Furthermore, the percentages of ELL students who did not respond to intervention are similar to what has been repeatedly documented in the RtI literature for native English speakers (Linan-Thompson et al., 2006). Specifically, two students, or eight percent of the intervention sample and one percent of the total sample of students screened, did not respond to the intervention used in the study. The authors conclude that an RtI model offers promise for ELL students at risk for reading problems, particularly when the intervention provided is explicit, systematic, and repetitive.

Reading interventions for at-risk ELL students. There is a growing literature on effective reading interventions for at-risk ELL students. Prior to 2005, only three studies using experimental designs were found in the literature on ELLs and reading interventions, and all had sample sizes of less than 100 participants, with no replications (Denton, Anthony, Parker, & Hasbrouck, 2004; Gunn, Biglan, Smolkowski, & Ary, 2000; Gunn, Smolkowski, Biglan, & Black, 2002). These groundbreaking studies found that instruction in phonological awareness and decoding is connected with improved oral fluency and word identification outcomes for ELL students who are having difficulty with reading. These outcomes appear to be attainable for ELLs who know very little English, and for ELLs who receive only a small amount of intervention. The interventions described were performed with trained instructional assistants or trained undergraduates, suggesting that they might be accessible to school personnel with a wide variety of educational backgrounds.

Four other studies prior to 2005 employed quasi- or non-experimental designs and can be used to provide information and generate future ideas for research (Hus, 2001; Leafstedt, Richards, & Gerber 2004; Linan-Thompson, Vaughn, Hickman-Davis, & Kouzekanani, 2003; Neal & Kelly, 1999). These studies also found an association between phonics instruction and improved academic outcomes, including improved performance on phoneme-segmentation, word reading, and oral fluency tasks. However, the Linan-Thompson et al. (2003) and Neal and Kelly (1999) results occurred following in-depth intervention in a number of reading areas, so it is difficult to attribute student progress to the phonemic-awareness instruction alone. In addition, the absence of a control group in these studies makes it impossible to generate any definitive conclusions about the effectiveness of the interventions.

Recently, Vaughn et al. (2006c) used an experimental design to investigate the effects of a first-grade reading and language development intervention on 41 Spanish speaking ELLs who failed a reading screening in both English and Spanish. The intervention consisted of eight months of daily, small-group systematic and explicit instruction (in English) on phonemic awareness, letter knowledge, word recognition, connected text fluency, comprehension, vocabulary development, and oral language expression. Drawing from effective ELL instructional behaviors, teachers providing the intervention were observed to ensure that they paced instruction, provided independent practice, scaffolding, and error correction, taught concepts to mastery, maintained student attentiveness, and elicited student responses.

Students randomly assigned to the intervention condition significantly outperformed their peers in the control (e.g., typical practice) condition on multiple measures of phonemic awareness, letter knowledge, word attack, comprehension, and spelling. Perhaps as a result of emphasizing story recall, intervention students made large gains in reading comprehension (ES = 1.08) compared to their peers in the control condition. These students also outperformed their peers in Spanish reading measures, even though the intervention was conducted in English. Research on this intervention program when conducted in Spanish has also demonstrated gains in Spanish phonological awareness, letter-sound identification, oral language, word attack, passage comprehension, spelling, and reading fluency (Vaughn et al., 2006a, 2006b).

The researchers replicated the intervention with a non-overlapping sample of 91 first grade students, and found similar results (Vaughn et al., 2006a). Specifically, intervention students performed significantly better on English measures of phonological awareness, word attack, word reading, and spelling. Notably, intervention students did not achieve greater gains in oral language compared to their peers in the control condition in either the original study or its replication, suggesting a need to refine the oral language component of the intervention.

Multiple baseline designs have also been used to investigate the efficacy of reading interventions in very small numbers of struggling ELL readers. Tam, Heward, and Heng (2006) reviewed the literature on the critical components of reading instruction for ELL students as well as for learning disabled students to develop an intervention consisting of vocabulary instruction, error correction, and fluency building. In addition, students received systematic, structured instruction, opportunities to practice and experience success, feedback and praise, and regular monitoring of progress. A multiple baseline across subjects design was used to analyze the effects of daily intervention on the oral reading rate and comprehension of five struggling ELL readers. Study results demonstrated that the intervention program improved the oral reading rates and reading comprehension of all five learners. Bliss, Skinner, and Adams (2006) used a multiple-baseline across word lists design to investigate the effects of a time-delay taped words intervention on one ELL students who was a struggling reader. Results show that across three separate lists of words, intervention caused the student’s average accurate responding to double compared to baseline.

Peer-assisted learning strategies (PALS) for ELLs with learning disabilities, as well as ELLs with low-, average-, and high-reading achievement, have also been investigated using an experimental design (Sáenz, Fuchs, & Fuchs, 2005). PALS is a reciprocal classwide peer-tutoring strategy that involves partner reading with retell, paragraph shrinking (summarizing), and prediction relay (predicting story outcomes). Classrooms randomly assigned to the intervention condition conducted the PALS activities three times a week for 35 minutes over the course of 15 weeks. Study results indicated large reading comprehension effect sizes for all students in the PALS condition, indicating that intervention assisted ELLs with learning disabilities as well as those without.

Finally, the literature suggests several approaches to literacy instruction for ELLs in addition to what is considered effective reading instruction for all students. For example, ELLs benefit from instruction in oral English proficiency, which is associated with gains in reading comprehension and writing skills for this population (August & Shanahan, 2006). In addition, it is important to merge English-language development with content instruction, provide instruction on English grammar and syntax, provide frequent opportunities for oral language use in the classroom, build vocabulary skills, use visuals to reinforce concepts, use cooperative learning and peer-tutoring strategies, and build on native language skills (Gersten & Baker, 2000). The Sheltered Instruction Observation Protocol (SIOP) model is one attempt to provide effective instruction for ELLs by including techniques such as building background knowledge, using comprehensible input (e.g., ensuring students understand the essence of what is presented to them), providing scaffolding and frequent opportunities for responding, and supporting both content and language objectives (Echevarria, Vogt, & Short, 2004).

Prereferral and early intervention teams. A variety of prereferral and early intervention team (PEIT) models have been developed and implemented in public schools, including Teacher Assistance Teams (Bay, Bryan, & O'Connor, 1994; Chalfant & Pysh, 1989; Short & Talley, 1996), Prereferral Intervention Teams (Graden, Casey, & Bonstrom, 1985; Ingalls & Hammond, 1996), Instructional Assessment Teams (Whitten & Dieker, 1995), Peer Intervention Teams (Saver & Downes, 1991), Mainstream Assistance Teams (Fuchs & Fuchs, 1989; Fuchs, Fuchs, & Bahr, 1990; Fuchs, Fuchs, Harris, & Roberts, 1996), Building Educational Support Teams (Henning-Stout, Lucas, & McCary, 1993), Instructional Support Teams (Kovaleski, Gickling, Morrow & Swank, 1999; Rock & Zigmond, 2001), Project Achieve (Knoff & Batsche, 1995), and Instructional Consultation Teams (Gravois & Rosenfield, 1996).

While team composition and problem-solving focus varies, the goal of most PEITs is to provide support and assistance to teachers who are having difficulty with particular students in the classroom (Levinsohn, 2000). PEITs can document the absence of effective instruction and intervention in the general education classroom, and support teachers in developing more effective classroom practices. This process is consistent with IDEA (2004), which allows an RtI approach for supporting academic achievement and identifying learning disabilities. From a special education eligibility perspective, PEIT teams can also provide documentation of special factors that may interfere with schooling, such as limited English proficiency, interrupted schooling, or cultural differences (Ortiz, Wilkinson, Robertson-Courtney, & Kushner, 2006).

While none of the above-mentioned PEIT models were developed specifically for minorities, implementing Instructional Consultation Teams, Mainstream Assistance Teams, Project Achieve, and Teacher Assistance Teams in ethnically diverse schools has resulted in an overall decrease in special education referrals (Bay, Bryan & O'Connor, 1994; Fuchs, Fuchs & Bahr, 1990; Gravois & Rosenfield, 2002, 2006; Knoff & Batsche, 1995; Weiner 2002). In addition, a study documenting the implementation of Teacher Assistance Teams in two schools in a Mexican-American, bilingual community found that TAT participants referred significantly fewer children than did non-participants; however, outcome data were not broken down by ethnicity or language (Bay, Bryan & O'Connor, 1994). Best practices in operating PEITs, as well as research on PEITs and ELL students, will be presented in depth in the following sections. Instructional Consultation (IC) Teams, the focus of the present research, will also be described in detail, and rationale for the present study will be summarized.

Best Practices in Prereferral and Early Intervention Teams

A number of best practices in operating, structuring, and ensuring effective group process in PEITs have been identified (Iverson, 2002; Kovaleski, 2002; Rosenfield & Gravois, 1996). Although not all suggested practices have been validated by research, there is some consensus about most of the following. A foundation for implementing PEITs should begin with a school and/or district-wide policy, including administrative support, funding, and principal advocacy for the establishment of school-based PEITs. All involved parties should be clear on the goals of PEITs, especially their emphasis on support for the student in general education as opposed to special education eligibility. It is important for all team members to be trained in communication skills, problem solving, team building and maintenance, curriculum-based assessment, behavioral assessment, and differentiated instructional and behavioral strategies; on-site technical assistance is suggested for effective PEIT implementation. In practice, PEIT models differ considerably in terms of these suggested effective practices.

To ensure effective team structure and group process, PEITs should meet on a regular basis and at a specific time, with an adequate length of time allotted for meetings. Members should be assigned to roles that capitalize on their interpersonal and professional strengths, such as leader, time keeper, recorder, and case manager. Team leaders should have group process skills and be able to train other team members. Effective group communication should be encouraged, and explicit oral and written role expectations should be provided.

Furthermore, PEITs should use research-based, high probability, and teacher-acceptable instructional strategies, and should support the initiation of interventions in the classroom to ensure treatment integrity. Parents, when included as part of the team, should be given clear information and feedback as to their role and the purpose of the interventions for their child. To ensure accountability, PEITs must be evaluated using on-going, data-based methods for ensuring student academic outcomes and school-wide indicators of success, including referral patterns and teacher and parent satisfaction.

In addition, Flugum and Reschly (1994) have defined quality indicators of interventions. These include a behavioral definition of the target behavior, direct measurement of the student's behavior in the natural setting prior to intervention implementation (baseline data), step-by-step, systematic intervention plan (e.g., What? When? How often?), implementation of intervention as planned (treatment integrity), graphing of intervention results, and, finally, direct comparison of the student's post-intervention performance with baseline data (assessment of change).

Research has shown that PEITs can have a positive impact in education in general. In a 1991 review of literature, Nelson, Smith, Taylor, Dodd and Reavis concluded that Teacher Assistance Teams, Prereferral Intervention Teams, and Mainstream Assistance Teams can reduce the number of students referred to special education and produce desired student performance. However, the authors cautioned that the majority of the studies reviewed did not provide the experimental design necessary to make strong causal claims.

Sindelar, Griffin, Smith & Watanabe (1992) echoed these findings in their review of Teacher Assistance Teams, Instructional Assistance Teams, Prereferral Intervention Teams, and Mainstream Assistance Teams, citing reduced referral rates, high consumer satisfaction, and student behavior change through improved practice. Burns and Symington (2002), authors of a more recent meta-analysis of 10 empirical articles documenting PEIT outcomes (e.g., Mainstream Assistance Teams, Instructional Consultation Teams, Prereferral Intervention Teams, Instructional Support Teams, Teacher Assistance Teams, Intervention Assistance Teams, and Child Study Teams) found that the PEIT approach had a strong effect on the desired systemic, student and teacher outcomes. The authors conclude that PEITs can reduce referrals to special education while enabling school psychologists to spend more time on services other than assessment.

Prereferral and Early Intervention Teams and ELL Students

In response to the cultural and linguistic variables that students bring to PEITs, Hoover and Collier (1991) suggest the use of a Teacher Assistance Child Intervention Team (TACIT). A TACIT is essentially an expanded Child Study Team that provides assistance to teachers who work with CLD students who have learning and behavioral concerns. The team has a flexible membership that changes in response to student needs, but includes a number of school and community members who are knowledgeable about educational techniques and strategies, the acculturation process and cross-cultural instructional strategies, the culture and language background of the student, and bilingual/ESL resources and instructional strategies. Upon reviewing a case, the team makes suggestions and provides guidance for modifying the student's learning environment. In addition, the TACIT works to sort out problems that may occur in response to cultural, linguistic, and acculturation variables as opposed to underlying disabilities.

In practice, schools sometimes modify PEITs to include bilingual school personnel. For example, Harris (1995) describes the introduction of Teacher Assistance Teams comprised of bilingual and special educators into a predominantly Hispanic school district. While ELL student outcomes were not measured, Harris provides anecdotal evidence suggesting that despite difficulty assuming consulting roles and maintaining the teams, team members ultimately felt successful in collaborating and assisting teachers with at-risk students.

The Instructional Support Team (IST) model in Pennsylvania has also made modifications in efforts to respond to CLD students, some of whom are ELL students. In

1993-1994, ten linguistically and culturally diverse school districts in their second year of IST implementation sent teams to attend training sessions on cultural and linguistic considerations of assessment for instruction, second language acquisition, multicultural assessment, and collaboration with the mainstream (Rodriguez-Diaz, Cochran & Kovaleski, 1997). The teams shared the knowledge they had acquired with other IST teams in their districts, and a training manual was developed on cultural awareness and acculturation, second language acquisition and linguistic diversity, instructional support for CLD students, and working with CLD parents. Although the effectiveness of using the manual was not empirically tested, the manual suggests that the student's language performance should only be compared to that of other students who have had similar cultural and linguistic experiences, and lays out the following considerations for addressing CLD and ELL student referrals:

1. Language dominance and English proficiency;
2. Cultural information;
3. Acculturation level;
4. Home environment;
5. Migration or immigration information;
6. School history, including disruptions;
7. Source of difficulty;
8. Interaction with students, parents, and teachers; and
9. Language/work samples.

There is limited research available documenting the outcomes of ELL students in schools that employ PEIT models. Robles-Piña (1996) surveyed 85 respondents from a linguistically diverse southeastern Texas school district that used multidisciplinary prereferral teams (operating under the Teacher Assistance Team model). Responses to a scenario indicated that language was used as a factor when making referral decisions for ELL students, and that there were no significant differences in ultimate referral numbers for ELL and non-ELL students. These findings suggest that the prereferral teams may have been effective in decreasing disproportionate referrals of ELL students to special education. However, the study did not investigate actual ELL cases in these schools.

Ortiz and Garcia (1988) advocate for a multi-faceted prereferral process that examines the effectiveness of the curriculum and instruction for minority language learners and takes into account both parental and teacher validation of the student's perceived difficulty. In addition, this process is designed to raise a series of questions specific to multicultural populations. For example, parental perceptions are seen as important because they can lead to valuable insight into the student's abilities in a non-academic, native language environment (Kavanaugh, 1994). Furthermore, involving the parents helps to demystify the American school system and demonstrate interest in and respect for the child's native culture. In addition, Ortiz and Garcia (1988) suggest that the teacher's qualifications and level of experience be examined to ensure that his or her observations are unbiased and based on knowledge about second language acquisition. Ortiz and Garcia's (1988) model can be summarized by the following sequence:

Step 1: Is the student experiencing academic difficulty?

Step 2: Is the curriculum known to be effective for language minority students? If the answer is no, then the curriculum should be adapted, supplemented and developed.

Step 3: Has the student's problem been validated? If not, then the following factors must be considered: inter- and intra-setting comparisons, inter-individual comparisons, inter-teacher perceptions, parental perceptions, and student work samples.

Step 4: Is there evidence of systematic efforts to identify the source of difficulty and take corrective action? If not, then the following factors must be evaluated: teacher (e.g., qualifications, experience, teaching style), instruction (e.g., language, standards, effectiveness), student (e.g., language proficiency, cultural characteristics, self-concept), and exposure to curriculum (e.g., continuity of exposure, basic skills, mastery).

Step 5: Do student difficulties persist?

Step 6: Have other programming alternatives been tried? If not, then program and placement alternatives such as tutoring should be considered.

Step 7: Do difficulties continue in spite of alternatives? If the answer is yes, the student is referred to special education.

Kavanaugh (1994) argues that all prereferral decisions made using Ortiz and Garcia's (1988) model should be team-based in order to control for individual opinions and bias. Furthermore, the team should ensure that a systematic effort has been made to identify the source of the student's difficulties, and should investigate the instructional or curricular changes that have been put in place to try to help the student.

The Assessment and Intervention Model for the Bilingual Exceptional Student (AIM for the BESt), which incorporates several of Ortiz and Garcia's (1988) ideas, includes the only documented PEIT model developed and implemented specifically for ELLs. A comprehensive service delivery system, AIM for the BESt was piloted in a central Texas school district with successful outcomes (Ortiz, Wilkinson, Robertson-Courtney & Bergman, 1991). AIM for the BESt includes implementation of effective instructional practices by regular and special educators, establishment of school-based problem-solving teams, and training appraisal personnel in informal assessment procedures including curriculum-based assessment. Steps in the AIM for the BESt model can be summarized as follows (Ortiz, Wilkinson, Robertson-Courtney & Kushner, 1991):

Step 1: The regular classroom teacher is trained in instructional strategies known to be effective for language minority students (e.g., Shared Literature and Graves Writing Workshop).

Step 2: When a student experiences difficulty, the regular classroom teacher, who has been trained in diagnostic/prescriptive or clinical teaching approaches, attempts to resolve the difficulty and validates the problem.

Step 3: If the problem is not resolved, the teacher refers the student to a Student/Teacher Assistance Team (S/TAT) consisting of regular and special educators and support personnel. The S/TAT works to determine the most effective intervention and usually involves the development of a plan to help the teacher resolve the problem. However, it may also involve referrals to other programs.

Step 4: If the problem is not resolved by the S/TAT prereferral process, a special education referral is initiated. A summary of the S/TAT's efforts accompanies the referral.

Step 5: Assessment personnel incorporate informal and curriculum-based assessments in the comprehensive individual assessment.

Step 6: If the child is placed, special educators use instructional strategies known to be effective for language minority students.

Student outcomes were documented in four AIM for the BESt elementary schools across two years. During the first year of implementation, more than three-quarters of the approximately 3,552 Hispanic students served by the participating school district were enrolled in programs for the learning disabled or speech handicapped. However, of the 100 requests for assistance which occurred over the two-year implementation period in the AIM for the BESt schools, 73% were resolved by the regular classroom teacher and/or by using alternatives such as support group participation and counseling. The researchers hypothesized that the use of PEITs offered a procedure for effective decision-making and helped identify school-wide problem areas and training needs.

Three categories of Hispanic students in grades one through four were also included for outcome data collection (n = 242): LEP learning disabled (LD), non-LEP LD, and non-handicapped LEP. Administration of the Peabody Picture Vocabulary Test-Revisited showed that LEP LD intervention students' English vocabulary scores increased across the two project years, suggesting that the instructional practices used by their teachers were effective. However, the experimental design used did not establish causality, so these findings are very limited.

In light of the literature, AIM for the BESt holds some promise for improving the educational outcomes of ELL students. However, the model was implemented in only four schools using a weak experimental design, and no additional research studies were found in the literature. In addition, AIM for the BESt has not been used anywhere else since 1991 (M. Kushner, personal communication, September, 2003).

Lopez (2006) and Ortiz et al. (2006) provide a recent set of considerations in implementing PEITs to support ELLs in general education classrooms. In addition to accepted best practices for PEIT operation and early intervention, they argue that PEITs must include individuals with expertise related to cultural and linguistic diversity, parents and/or extended family, and interpreters as needed. When PEITs do not have localized expertise related to CLD and ELL students, professional development on the following topics must be provided: second-language acquisition, assessment of proficiency in student's first and second language, socio-cultural influences in teaching and learning, ESL teaching strategies, and strategies for working with CLD families and communities. Furthermore, data gathered by the PEIT should describe the student's L1 and L2 proficiency in both social and academic contexts, access to continuous, effective instruction, academic achievement in the language(s) of instruction, progress towards acquiring English, and types of settings where problems occur (e.g., home vs. school contexts; Lopez, 2006; Ortiz et al., 2006).

Instructional Consultation Teams

One PEIT model that appears promising for effective delivery of services to ELL students is Instructional Consultation Teams (IC Teams). Based on documented best practices in operating effective PEITs, the IC Team model is a teacher support team model that focuses on team collaboration, communication skills, systematic problem-solving, curriculum-based assessment (CBA), functional behavior assessment, empirically based instructional practices, and data-based decision making (Rosenfield, 1987; Rosenfield, 2002; Rosenfield & Gravois, 1996). The goal of the IC Team, which serves as a delivery system for consultee-centered consultation, is to enhance, improve and increase student and staff performance. Key assumptions of the model include treating all students as learners, focusing problem-solving on the instructional match and setting, creating a strong problem-solving and learning community in the school as the foundation for professional and student success, and assuming change as a process and not an event. Rosenfield, Silva, and Gravois (2007) provide a description of the theoretical background of IC Teams.

Unlike traditional assessment models, the focus of problem-solving in the IC Team model is not just the student but his or her instruction, tasks, and environment as well. Effective learning occurs when these factors are matched. Therefore, the IC Team model examines the student's prior knowledge, level of skill development, and learning rate in conjunction with the teacher's expectations for student, use of instructional time, classroom management procedures, instructional delivery, and assessment, as well as the task demands presented to the student.

Teachers access IC Team members, who are trained as instructional consultants, on a voluntary basis and work collaboratively with them through a formalized problem solving process. IC Teams are composed of multiple school stakeholders, including administrators, general and special educators, school psychologists, school counselors, health care providers, and social workers. When the IC Team receives a request for assistance, a team member is assigned as case manager, and becomes responsible for guiding the teacher through a set of reflective problem solving stages: entry and contracting, problem identification and analysis, intervention design, intervention implementation and evaluation, and closure (see Rosenfield, Silva, & Gravois, 2007).

Implementing IC Teams. IC Teams are typically implemented in school districts with support from the University of Maryland-based Lab for IC Teams. The Lab for IC Teams services include comprehensive and empirically-based training, ongoing technical assistance, and evaluation of critical components of the IC Team model, including changes in professional functioning, implementation, and outcomes. At the school-level, an IC Teams facilitator, who has received advanced training in the IC Teams process, serves as a resource to the IC Team.

IC Teams Outcomes. The Lab for IC Teams has developed a "scaling up" process for IC Teams, using a comprehensive implementation process (described in Gravois, Knotek, and Babinski, 2001) that has been replicated with consistent outcomes in over 200 schools across 7 states since the 1990s (Gravois & Rosenfield, 2006), with earlier variations in other settings. A federally funded experimental evaluation of the IC Team model on a number of student, teacher, and school outcomes is currently underway. Previous quasi-experimental and descriptive studies have provided preliminary support that implementation of IC Teams may impact a number of student, teacher, and school-wide outcomes, as summarized in Gravois & Rosenfield, 2002):

- Decreased number of special education referrals for all students;
- Increased student academic and behavioral goal achievement;

- Increased teacher support, satisfaction and perception of consultation effectiveness;
- Increased teacher implementation of CBA and new instructional strategies;
- Increased professional collaboration;
- Increased teacher problem-solving ability and change in beliefs about problem origins; and
- Improved school climate and culture.

Gravois and Rosenfield (2002) used confirmatory program evaluation's criterion of consistency to document several of these outcomes. However, confirmatory program evaluation methods are open to significant internal validity threats, including selection, maturation, history, regression, and ambiguous temporal precedence threats. In addition, confirmatory program evaluation requires a large number of outcome variables and extensive longitudinal participant follow-up, which were not always present in the studies reviewed in Gravois and Rosenfield (2002).

A quasi-experimental study that compared IC Teams to Student Support Teams (school-based, non-formalized problem solving teams focusing on the student) in a suburban school district in the mid-Atlantic region found that students referred to IC Teams were much less likely to be screened for and/or placed in special education (Levinsohn, 2000). Even more strikingly, teachers receiving support through IC Teams were substantially less likely to refer minority students to special education compared to teachers receiving support through Student Support Teams (SST; Levinsohn, 2000). Levinsohn found that none of the African American students receiving IC Teams services were subsequently referred to or placed in special education, whereas 80% of the African American students receiving SST services were referred to special education, with half of those students going on to be placed in special education. Additional referral data from one Maryland public school system showed that in schools using the IC Team model, the percentage of total referrals to IEP Teams for African American, Asian and Hispanic students was lower that the average representation for each ethnic group in the school (Howard County Public School System, 2001).

Another study provided evidence for decreased disproportionate evaluation and placement of minority students in special education as a result of IC Team implementation (Gravois & Rosenfield, 2006). Gravois and Rosenfield (2006) used risk indices, odds ratios, and composition indices to investigate disproportionate evaluation and placement of minority students in special education. They found that schools which implemented IC Teams showed decreases on all three disproportionality indices over a two year period. According to the researchers, "these results indicate that solutions to reduce disproportionate placement of minority students may be found in the implementation of effective early intervention support to teachers that specifically focuses on improving the instructional delivery in the general education classroom" (Gravois & Rosenfield, 2006, p. 50). However, the impact of such practices on the disproportionate special education placements of ELL students has not been documented.

IC Teams and ELL students. The IC Team model stands out as a promising approach for addressing the needs of ELL students in general education classrooms. In addition to being based on best practices for PEITs (Iverson, 2002, Kovaleski, 2002, Rosenfield & Gravois, 1996) and incorporating all the indicators of quality prereferral interventions (Flugum & Reschly, 1994), it incorporates principles that have been suggested as effective for instructing ELL students. These principles include building on student prior knowledge, using collaborative problem-solving and instructional assessment, providing supports to teachers, examining the curriculum, and using appropriate instructional strategies (Burnette, 1998; Echevarria & Graves 1998; Gersten, Brengelman & Jiménez, 1994; Ortiz, 1997; Ortiz & Kushner 1997; Rodriguez & Carrasquillo, 1997; Warger & Burnette, 2000).

For example, Echevarria and Graves (1998) and Ortiz and Kushner (1997) cite the importance of examining the appropriateness of the curriculum and assigned tasks as well as the quality and amount of instruction, teaching prerequisite skills, goal setting, and consistently measuring academic progress. In addition, Gersten, Brengelman and Jiménez (1994) cite the need for collaboration among educators focusing on curriculum design and instructional strategies. Ortiz (1997) calls for "a problem-solving phase in which teachers first adapt instruction and/or the classroom environment to improve student performance and request assistance from others…" (p. 323). Warger and Burnette (2000) note the importance of building on student strengths and providing supports to instructional staff prior to special education referral. Rodriguez and Carrasquillo (1997) identify the importance of conducting curriculum-based assessments. Finally, Burnette (1998) calls for training and collaborative problem-solving to extend the teacher's repertoire of instructional strategies and involve multiple perspectives.

As a support to instructional staff, the IC Team model already utilizes collaborative problem-solving to examine instructional level and match, curriculum, tasks, quality and amount of instruction, and student's prior knowledge, and incorporates goal-setting and measurement of academic progress. In addition, IC Teams incorporate principles that may better address the needs of ELL students in the general classroom, such as using a collaborative problem-solving process to support teachers in examining the appropriateness of the curriculum and instruction, and collecting curriculum-based assessment data to help identify the prior knowledge of the student (Burnette, 1998; Echevarria & Graves 1998; Gersten, Brengelman & Jiménez, 1994; Lopez, 2006; Ortiz, 1997; Ortiz & Kushner 1997; Rodriguez & Carrasquillo, 1997; Warger and Burnette, 2000). Finally, since a request for assistance to an IC Team is viewed as an opportunity for the teacher to engage in a professional consultation relationship with the potential to increase his or her instructional competency, the IC Team model may be particularly effective in terms of supporting teachers of ELL students, many of whom have not received training in instructing this population (McCardle et al., 2005). Perhaps as a result of all of these factors, the IC Team model has been recommended as a viable preventative delivery system for supporting teachers of ELL students (Lopez & Truesdell, 2007).

The effects of IC Teams on the referral rates of ELL students have been documented using descriptive statistics and chi-square analyses (Silva & Rosenfield, 2004; Silva, 2005). Results showed that compared to non-ELLs, ELLs were more frequently initially referred to IEP Teams instead of IC Teams. IC Teams lowered ultimate student referrals to IEP Teams more for non-ELL students than for ELL students. However, less than half of ELL students referred to IC Teams were ultimately referred to IEP Teams, compared to 100% of ELL students referred to pre-existing PEIT models. ELL students who were initially referred to IEP Teams were more likely to be evaluated for special education eligibility compared to non-ELLs (Silva & Rosenfield, 2004). Further analysis using logistic regression found that although the special education referral and placement rates decreased for ELL students receiving support from IC Teams, ELL students were more likely than non-ELL students to be referred and classified as disabled. In other words, IC Teams were found to be more effective than existing PEITs in meeting the needs of ELL and non-ELL students in general as opposed to special education, but not as effective with ELL students (Silva, 2005). However, the IC Teams schools investigated in the sample were not randomly assigned to implement the IC Team model. Therefore, it is possible that the schools which decided to implement IC Teams had other factors in common that were not controlled for in the Silva (2005) study.

Conclusion

Schools are struggling as they attempt to meet the needs of ELL students (e.g., Meece & Kurtz-Costes, 2001). Instructional environments may not be optimal for ELL students (e.g., Arreaga-Mayer & Perdomo-Rivera, 1996; Silva, Hook, & Sheppard, 2005), and teachers may not be adequately prepared to instruct this population (e.g., McCardle et al, 2005). These factors could play contributing roles to documented increased special education referrals and poor academic outcomes of ELL students.

Although a number of teacher support models have been developed that show promise in addressing academic and behavioral problems and decreasing referral rates of minority students to special education, the IC Team model is one of the few for which documented lower special education referrals and placements exist for ELL children (Silva, 2005). In addition, the IC Team model may be particularly effective for teachers with diverse classrooms, since teachers who request assistance from the IC Team receive support in terms of differentiating instruction. Nevertheless, school-wide academic outcomes and special education placement patterns have never been experimentally examined for all students, including all ELL students, in schools where IC Teams are implemented. In addition, variables that may lead to IC Teams outcomes have never been hierarchically modeled, despite the fact that students are nested within schools, and that IC Teams have the capacity to influence school-level outcomes.

The present study employed a quasi-experimental design and hierarchical linear modeling (HLM; Raudenbush & Bryk, 2002) to investigate whether the IC Team model differentially influences the reading achievement and special education placement of all students, and of ELL students in particular. Even though it is not possible to assess the validity of the placements in special education, special education placement is important to consider because it may serve as a marker variable for the effectiveness of IC in general education. Specifically, if IC is effective, special education placement rates may decrease, perhaps because teachers are more likely to be able to address the instructional needs of their students in general education. However, the use of special education as a marker variable can be problematic because there may be other reasons for decreases in special education referrals when PEIT models such as IC Teams are implemented. For example, teachers may stop referring because they do not want to participate in the PEIT process.

Based on the literature reviewed, the following predictor variables were included at the student, classroom, or school level in the various HLM models:

- ELL student status (e.g., Bilingual Education Act, 1994; CEC & NABSE, 2002; McCardle et al., 2005; Meece & Kurtz-Costes, 2001);
- Ethnicity (e.g., Donovan & Cross, 2002);
- Gender (e.g., Lloyd, Kauffman, Landrum, & Roe, 1991; Rueda, 1985);
- SES (as measured by free and reduced meal status; Entwisle & Alexander, 1992; Burkam et al., 2004);
- School SES and ethnic composition (e.g., Mosteller & Moynihan, 1972; Willms, 1986); and
- Overall school achievement (e.g., Willms, 1985).

Prior achievement scores and grade level will also be considered as predictor variables.

CHAPTER 3

METHODS

Introduction

This chapter will describe the participants who were involved in the present study, beginning with contextual information about ESL services in their school district. The data collection procedures will then be explained in detail, including information about the kinds of data collected. Finally, the research questions will be presented, along with the research design and data analysis methods used to answer these questions.

Description of ESL Services in Participating School District

The present data were gathered from an ethnically and linguistically diverse suburban public school district in a mid-Atlantic state. During the 2005-2006 school year, approximately 20% of the elementary school students in this district were identified as needing ESL services based on their IDEA Proficiency Test scores. The majority of these ELL students (79%) were Spanish speakers. In terms of country of origin, 56% of ELL students were from the United States, 13% were from El Salvador, 7% were from Mexico, and 3% were from Honduras (C. Bass, ESOL & Foreign Language Supervisor, personal communication, May, 2007).

ESL student proficiency levels range from Level 1 to Level 4, and are determined based on a variety of information, including test scores and classroom performance (D. Hankins, ESOL Dual Language Assessment Specialist, personal communication, May, 2007). Elementary school students identified as needing Level 1 ESL support and whose parents give consent are served in up to three (45 to 90 minute) blocks of ESL instruction, with at least one block of "pull-out" content-based instruction. In comparison, Level 2 ESL students spend more time in their mainstream classes, and Level 3 and 4 students receive all of their instruction through the mainstream, with support from the ESL program. Once students achieve academic proficiency, including a score of nine or higher on the IDEA Proficiency Test, they are placed on "monitor" status. These students do not receive regular ESL program support, and are no longer eligible for accommodations on standardized testing. Finally, the district does not ascribe to any one particular ESL instructional model, but uses scaffolding of instruction to follow the state Standards of Learning throughout the curriculum (D. Hankins, ESOL Dual Language Assessment Specialist, personal communication, May 2007).

Description of Participants

During the 2005-2006 school year, 11 schools in this district participated in an Instructional Consultation Teams (IC Teams) project. Schools were in their second (n = 6) or third (n = 5) year of IC Teams implementation. In addition, 17 nonparticipating schools from the same suburban public school district served as a nonequivalent "control" group. Participants in the present study include all fourth and fifth grade students (in 2005-2006) for whom data exist in the 11 "treatment" schools and 17 nonequivalent control schools. ELL students comprised 38% of the IC Teams sample and 13% of the control sample. Students who were missing SOL achievement test data from both 2004-2005 and 2005-2006 school years (6 %) were not included in the students-within-schools HLM analyses of SOL reading achievement. All students had information about whether or not they were identified as needing special education services in the 2005-2006 school years.

The fourth and fifth grade student population in each school generally encompassed a wide range of socioeconomic statuses and ethnic backgrounds, as shown in Tables 1 and 2. Student ethnicities included Caucasian (39%), Hispanic (27%), African American (23%), Asian (7%), American Indian (.3%), and Unspecified (4%).

Table 1

Characteristics of IC Teams Schools

School	Percent receiving FARM	Percent receiving ESL	Percent historically disadvantaged minority	Percent receiving special education
1	54	38	75	13
2	59	24	81	14
3	59	49	72	15
4	59	25	75	20
5	69	58	83	15
6	73	47	77	13
7	66	43	77	17
8	57	44	69	11
9	59	32	77	12
10	58	25	77	9
11	55	29	66	13
Median	59	38	77	13

Table 2

Characteristics of Nonequivalent Control Schools

School	Percent receiving FARM	Percent receiving ESL	Percent historically disadvantaged minority	Percent receiving special education
1	42	26	68	16
2	19	12	47	12
3	5	1	17	13
4	45	38	72	15
5	12	3	35	13
6	9	1	26	10
7	54	32	73	14
8	14	23	40	10
9	6	3	22	7
10	30	16	64	18
11	24	15	44	13
12	21	8	53	11
13	5	1	18	11
14	39	22	63	12
15	11	3	24	6
16	34	23	69	16
17	4	5	24	8
Median	19	12	44	12

The medians suggest that there were differences in enrollment between IC Teams and control schools. Analysis of variance (ANOVA) was therefore performed to determine which differences between treatment and control schools were significant.

Table 3

ANOVA Results: Treatment and Control School Enrollment Characteristics

School Variable (means)	Sums of Squares	Degrees of Freedom	F	P-Value
FARMS	.99	1	57.89	.00
ESOL	.39	1	28.14	.00
HISDIS	.63	1	23.26	.00
SPED	.00	1	2.04	.17

The ANOVA results (Table 3) show that there are significant differences between IC Teams and control schools in terms of percent of students from lower SES and historically disadvantaged minority backgrounds, percent of ELL students, and average 2004-2005 SOL achievement scores. Special education placement did not significantly differ between IC Teams and control schools. In addition, all schools were comprised of approximately equal numbers of boys and girls, as well as approximately equal numbers of fourth and fifth graders. As is evident from the school demographic compositions presented, a limitation of the proposed study is that treatment schools are noncomparable to control schools, in that they had significantly higher percentages of students from populations considered to be at-risk for academic progress (e.g., Donovan & Cross, 2002).

One explanation could be that needier schools were selected to implement IC Teams. This hypothesis was confirmed when a propensity analysis was attempted to account for school-level factors which might have increased the chances of a school being assigned to implement IC Teams. To calculate propensity scores, logistic regressions were run based on percent ELL student population, percent special education population, percent low SES student population, percent historically disadvantaged minority student population, and school prior achievement using treatment or control as an outcome. The resulting logistic regression equation would have been used to calculate the log odds of treatment or control condition by applying the Beta weights to the predictor scores. However, the results of the logistic regression indicated that treatment decisions were made based on the predictors. Specifically, the classification table indicated 100% classification, and predicted probability scores equaled either the treatment or control condition (e.g., 0 or 1). Therefore, propensity scores could not be calculated, and it was confirmed that the variables in question were used by the district when deciding which schools should implement the IC Team model.

Level of IC Teams Implementation

The IC Teams Level of Implementation (LOI) Scale measures the degree to which IC Teams has been implemented within a school. The LOI Scale, administered by University of Maryland school psychology students, is comprised of interviews and record reviews that assess whether the following two critical dimensions of the IC Teams process are in place: the collaborative process and the delivery system. The collaborative process score represents how closely team members adhere to the collaborative problem-solving process. The delivery system score represents the integrity of the IC Team's structure, the procedures used to collect data and monitor student progress, and classroom teacher ease of access to the team. Together, the collaborative process and delivery system combine to generate an overall implementation score. A school is considered to be at a high implementation level when it achieves an Overall Implementation benchmark of 80% or higher. Table 4 summarizes 2005-2006 LOI scores for the 11 IC Teams "treatment" schools.

As shown in Table 4, 10 of the 11 IC Teams "treatment" schools had fully implemented the IC Teams model. In these 10 schools, scores for overall IC Teams implementation, collaborative process, and delivery system exceeded the 80% benchmark during the 2005-2006 school year. School 2 exceeded the 80% benchmark in terms of delivery system, but was below expected benchmark levels in terms of collaborative process and overall IC Team model implementation. Therefore, only one treatment school in the present study had not fully implemented the IC Team model; the reasons for this finding were not given.

Table 4

Level of IC Teams Implementation Scores

School	Overall LOI	Collaborative Process	Delivery System
1	93	97	85
2	74	71	81
3	91	95	83
4	98	98	98
5	94	93	96
6	88	86	93
7	96	97	95
8	99	100	96
9	94	96	90
10	92	94	88
11	93	94	93
Median	92	93	91

Data Collection Procedures

The data used in this research were collected as part of a larger federally-funded program evaluation for the 17 control schools involved in an experimental study and a contract with the school district, by the Lab for Instructional Consultation Teams, for the 11 schools that began implementation of IC Teams prior to the federal grant. Specifically, this research used end-of-year special education placement status and SOL reading achievement scores for the 2005-2006 school year. De-identified student roster information, including FARM status, gender, ethnicity, ELL status (receiving ESL services or not), grade level (fourth or fifth grade), special education placement status, and 2004-2006 SOL achievement data were collected by the school district and these archival data were forwarded to the staff of the federally funded program evaluation in spring 2007. The school district has approved research on the IC Team model in the schools. In addition, the Institutional Review Board at the University of Maryland has approved the data collection.

SOL Assessments. The SOL Assessments were developed by the Virginia State Department of Education, Harcourt Assessment, and local education agencies and school divisions. SOL Assessments are given annually in Virginia and are meant to hold schools accountable for teaching Virginia's Standards of Learning (Hambleton et al., n.d.). The most recent publicly available technical manual from the Department of Education is for the 2003-2004 administration. Internal consistency reliability estimates (Kuder-Richardson Formula 20) are reported for grades three and five in Reading, Mathematics, History/Social Science, and Science, and range from .85 to .90 (Virginia State Department of Education, 2005). Hambleton et al. (n.d.) report that these reliability coefficients have changed little across the 1998, 1999, and 2000 SOL assessment administrations. Hambleton et al. (n.d.) found that the SOL assessments had adequate content validity, indicating that test items provide information about the intended Virginia Standards of Learning.

The SOL reading test scores from the spring 2006 administration are one of the outcome variables in the present study. According to the Virginia State Department of Education (2005 a, b), these tests are designed to assess use of word analysis strategies and information resources, as well as demonstrate comprehension of written text. The SOL Reading tests are currently taken by students in grades three through eight and eleven in an untimed administration each May. Tests consist of between 40 and 50 multiple choice items. As of 2006-2007, all ELL students who have been in the United States for 12 months or longer are required to take the Reading SOL test.

During the years investigated by the present study (2004-2006), Level 1 and Level 2 ELL students were allowed to take the Stanford English Language Proficiency (SELP) test as a proxy for the SOL reading test (J. Cassata, Supervisor of Program Evaluation, personal communication, May, 2007). Although some Level 1 and Level 2 ELL students took the SOL reading test during those years, it is unclear how decisions were made regarding which Level 1 and 2 ELLs took the SOL. Level 3 and Level 4 ELL students were all required to take the reading SOL tests at their grade level. Level 3 students were permitted "standard and non-standard accommodations which could have included read aloud" whereas Level 4 students, who are determined to read near grade level, were not permitted a "read-aloud" accommodation (D. Hankins, personal communication, May, 2007).

Research Questions and Design

The research questions are as follows:

1. Does the IC Team model improve the reading achievement of students (in grades 4 and 5)?
2. Does the IC Team model differentially influence reading achievement for ELL students (in grades 4 and 5)?

3. Does the IC Team model decrease special education placement of students (in grades 4 and 5)?
4. Does the IC Team model differentially influence special education placement for ELL students (in grades 4 and 5)?

Hierarchical Linear Modeling (HLM), which has been described as being most appropriate and useful for conducting studies of school effects within educational contexts (Lee, 2000), was used to analyze the data. A quasi-experimental design consisting of an untreated control group with dependent proxy-pretest (predictor variables) and post-test (outcome variables) was used to investigate the first two research questions relating to reading achievement (Shadish, Cook, & Campbell, 2002). This design is frequently referred to as a nonequivalent comparison group design. Although random assignment of schools to conditions is not present, a quasi-experimental design with control groups and proxy-pretest measures is otherwise similar in purpose and structure to a randomized experiment (Shadish et al., 2002). Compared to randomized trials, the major weakness of a quasi-experimental nonequivalent comparison group design is a selection threat to internal validity. Since the treatment and control groups are not created to be probabilistically similar, it is difficult to know whether the observed outcome is due to the treatment or some unmeasured prior existing difference among the groups.

In the present study, the exploration and statistical control of group differences and the addition of prior year SOL achievement data allow exploration of the possible size and direction of selection bias for the first two research questions. Since the fifth grade students in the present sample did not take the reading SOL in 2004-2005, their history SOL scores were used as a proxy pre-test (predictor variable) for prior achievement. Fourth grade students took a combination of reading, math, science, and history SOL tests in 2004-2005, so average scores were used to create composite proxy pre-test (predictor variable) scores for prior achievement (Cronbach's alpha = .88). Analyses indicate that 2004-2005 SOL composite test scores were significantly correlated with 2005-2006 reading SOL test scores ($p = .00$ for both fourth and fifth graders).

For the research questions investigating special education placement, prior year placement data were not available. As a result, a quasi-experimental design consisting of a post-test only design with nonequivalent groups was used (Shadish, Cook, & Campbell, 2002). The omission of 2004-2005 special education placement data makes it difficult to separate treatment effects from selection effects, particularly given pre-existing differences in terms of school special education enrollment, so research questions 3 and 4 could not be fully answered. Instead, correlations between variables were explored using underspecified models; causal statement could not be made for these two research questions.

General Data Analysis Procedures

Because schools, and not classrooms or individuals, were assigned to treatment, students within school are not independent cases and are nested within schools. Therefore, data were explored using HLM (Raudenbush & Bryk, 2002) with the individual at level one and the school at level two. In addition, classrooms-within-schools were also analyzed using HLM, since the IC Team model is a consultee-centered consultation model. Specifically, the IC Team model can be conceptualized as a classroom level intervention, since it is designed to improve teacher performance, which in turn improves student performance. Ideally, such a delivery system would be studied by specifying a three-level HLM model, but the present data do not permit a full investigation of both student and teacher (classroom) outcomes in the same model. To specify a three-level model, more schools would need to be included to ensure appropriate power. In the present study, results are presented for both students-within-schools and classrooms-within-schools.

In general, the data analysis strategy used can be considered an analysis of covariance (ANCOVA) with a random effect. The use of a covariate in ANCOVA helps achieve statistical control of error when it is not possible to achieve experimental control. In the present study, level 1 variables were used as covariate controls. In all cases, a fully unconditional HLM model was created first, in which no predictors were specified, and the variance of the dependant variable was partitioned in terms of between-school variance and either individual or classroom variance. Fully unconditional model results give two estimates for the coefficient: an average effect (fixed effects) and whether the effect varies across schools (random effects). Next, a within-schools model was created in all cases; student or classroom predictor variables were added at level one. Then, final models were created, which generally consisted of adding IC Teams treatment uncentered at level 2 at both the intercept (is treatment effective) and slope (is treatment equitable for ELL students). Final models consisted of all level 1 predictors specified as grand-mean centered with fixed effects except for ELL status, which was added group-mean centered with the possibility of a random effect. The addition of demographic variables as grand-mean centered at level 1 also controlled for differences within schools in the average enrollment characteristics of students.

A power analysis was conducted using Optimal Design Software (retrieved May 28, 2007 from http://sitemaker.umich.edu/group-based/optimal_design_software). For the outcome of 2006 spring SOL reading achievement scores, the power to detect an effect size of .20 is estimated to be approximately between .80 and .90, given an approximate average of 212 students within each of the 28 schools. The power to detect an effect size of .40 is estimated to be approximately 1 (Figure 1).

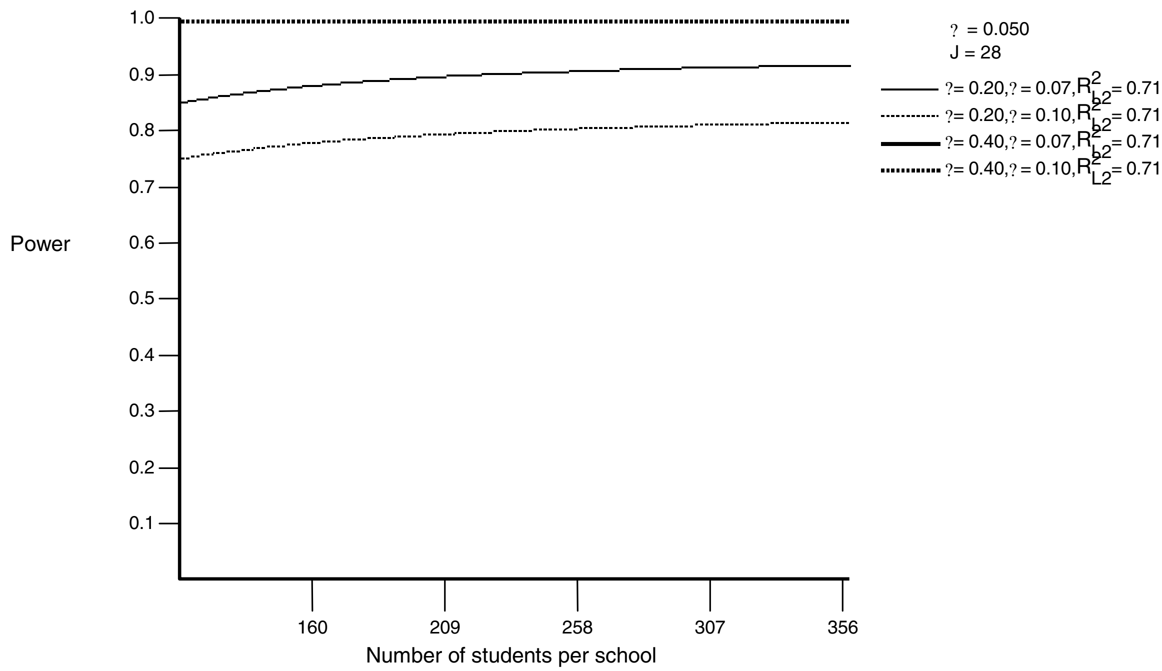

Figure 1. Power Analysis for Reading Achievement

For the dichotomous outcome of 2006 special education placement, the power to detect an effect size is estimated to be close to 1.

All variables are described in Table 5, with additional descriptive information and descriptive statistics available in Appendices A and B. Correlations between student-level predictors are described in Appendix C. Multicollinearity was explored using SPSS; variance inflation factors (VIF) were found to be lower than 7, and partial correlations were mostly lower than zero-order correlations, as expected (Appendix D). Composite and continuous variables (e.g., SOL scores) were transformed into z-scores for standardization to ease interpretation in HLM; z-scored continuous variables are in reference to the population. Effect sizes for reading achievement are equal to the coefficient for z-scored variables. Prior to recoding variables, missing data were accounted for at the individual level.

At the individual level, missing data were recoded into a format that would be interpreted by HLM as missing data (i.e., SYSMIS). None of the school level variables selected had missing data, so no schools were lost. Upon analysis of the distribution of the outcome variable, normality was assumed and no further corrections were made. The predictor variables of interest in the current study appeared to be normally distributed upon inspection. A dummy variable was created for student ethnicity, by scoring non-minority students as zero and minority students as one. Historically disadvantaged minority students were considered to be African American, American Indian, Hawaiian, Hispanic, and Unspecified, and non-historically disadvantaged students were considered to be Caucasian and Asian. Asian students were grouped with Caucasian students because they typically score similar to each other on measures of achievement and are therefore not considered historically disadvantaged students (Stanley & Okazaki, 1990).

Table 5

Description of Variables

	Student-level Dependent Variables
ZREADSS	The z-scored Standard Score on reading SOL taken in 2005-06.
SPED	Whether student was identified as needing special education in 2006.
	Student-level Predictors
ZSOL0405	Composite z-scored SOL score for all SOL tests given in 2004-05. Fourth graders took all SOLs as third graders; fifth graders took History SOL as fourth graders (prior achievement proxy).
ESOL	Whether student received ESOL services in 2005-06.
FARMS	Whether student received free or reduced meals in 2005-06 (SES proxy).
HISDIS	Whether student belongs to a historically disadvantaged group as a result of their ethnicity.
GENDER	Whether student is male or female.
GRADE	Student's grade level in 2005-06.
	Classroom-level Dependent Variables
CZREADSS	The z-scored class average standard score on reading SOL tests taken in 2005-06.
CSPED	The percentage of students in special education in the class (all categories).

Classroom-level Predictors	
TeachID	The teacher assigned to each student.
CZPFARMS	The z-scored percentage of students in the classroom receiving free and reduced meals.
CZPESOL	The z-scored percentage of ELL students in the class.
CZPHISD	The z-scored percentage of historically disadvantaged minority students in the class (non-white, non-Asian).
CZSOL05	The z-scored composite class average SOL test score for all SOL tests given in 2004-05. Fourth graders took all SOL tests as third graders; fifth graders took the History SOL test as fourth graders (prior achievement proxy).
CGENDER	Percentage of males in the class.
CGRADE	Percentage of fifth graders in the class (some classes were mixed).
School-level Predictors	
ZPESOL	The z-scored percentage of ESOL students in the school.
ICT	Whether the school had an IC Team in 2005-06.

CHAPTER 4

RESULTS

Data Analysis Procedures, Research Questions 1 and 2

Unconditional students-within-schools model for reading achievement. An unconditional model of the variation of spring reading SOL scores was created to predict variation between schools in terms of student reading achievement scores and school level characteristics. To create the fully unconditional model, no predictors were specified at the individual or school level (Figure 2). In effect, the variance of the dependent variable, 2005-06 spring reading SOL score, was partitioned in terms of between-school variance and individual variance.

Level 1 Model:

$$\text{ZREADSS} = \beta_0 + r$$

Level 2 Model:

$$\beta_0 = \gamma_{00} + u_0$$

Figure 2. Unconditional Students-Within-Schools Model for Reading Achievement

A multi-variate data matrix (MDM) was created. This analysis resulted in an intra-class correlation of 0.07 (ICC = between-school variance/total variance = .07/.07 + .93), meaning that approximately 7% of the variance in spring SOL scores exists between and within schools. The point estimate of the outcome variable of 2006 SOL reading achievement score is not significantly different from zero ($p = .75$; Table 6). However, 2006 reading achievement scores do vary across schools (*p* = .00; Table 6). The reliability estimate of the intercept is 0.93, which is considered to be reasonable with a school sample to model variability.

Table 6

Unconditional Students-Within-Schools Model Results for Reading Achievement

Fixed Effects	Coefficient	Standard Error	P-Value	
ZREADSS	-.02	.05	.75	
Random Effects	SD	Variance	P-Value	Reliability
ZREADSS	.27	.07	.00	.93
R	.96	.93		

Students-Within-Schools Model for Reading Achievement. Next, a within-school model was created for the outcome variable of interest (ZREADSS) by adding individual student predictors at Level 1 to model 2006 spring reading achievement, and leaving Level 2 fully unconditional. All predictors were specified as controls (grand-mean centered with fixed effects), with the exception of ESOL, the predictor variable of interest. In order to understand how being an ELL student impacts reading achievement scores between schools, ESOL was specified as group-mean centered with the possibility of a random effect (Figure 3).

Level 1 Model:

$$ZREADSS = \beta_0 + \beta_1(\boldsymbol{GRADE}) + \beta_2(\boldsymbol{GENDER}) + \beta_3(\boldsymbol{FARMS}) + \beta_4(\mathbf{ESOL}) + \beta_5(\boldsymbol{HISDIS}) + \beta_6(\boldsymbol{ZSOL0405}) + r$$

Level 2 Model:

$$\beta_0 = \gamma_{00} + u_0$$

$$\beta_1 = \gamma_{10}$$

$$\beta_2 = \gamma_{20}$$

$$\beta_3 = \gamma_{30}$$

$$\beta_4 = \gamma_{40} + u_4$$

$$\beta_5 = \gamma_{50}$$

$$\beta_6 = \gamma_{60}$$

Note. **Bold** font indicates group-mean centering; ***bold italic*** font indicates grand-mean centering.

Figure 3. Students-Within-Schools Model for Reading Achievement

The within schools results (Table 7) indicate that grade, gender, socioeconomic status, historically disadvantaged minority status, and prior achievement scores may all influence spring 2006 reading achievement scores independently of other variables in the model. Specifically, fifth graders and students with higher prior achievement scores had higher spring 2006 reading achievement scores whereas males and students from historically disadvantaged minority groups had lower spring 2006 reading achievement scores. Being an ELL student did not appear to impact spring 2006 reading achievement scores independently of other variables in the model.[1] Being from a lower SES background was also not significant at the .05 level (p = .06). Based on chi-square tests with 27 degrees of freedom, it appears that ELL student spring 2006 reading achievement scores do not significantly vary between schools in this model (p = .19).

Table 7

Students-Within-Schools Model Results for Reading Achievement

Fixed Effects	Coefficient	Standard Error	P-Value	
ZREADSS	.00	.03	.96	
GRADE	.19	.02	.00	
GENDER	-.13	.02	.00	
FARMS	-.06	.03	.06	
ESOL	-.05	.04	.21	
HISDIS	-.11	.03	.00	
ZSOL0405	.62	.01	.00	
Random Effects	SD	Variance	P-Value	Reliability
ZREADSS, u_0	.14	.02	.00	.84
ESOL, u_4	.09	.01	.18	.19
R	.72	.52		

Note. Bold variables are group mean centered; Bold and italicized variables are grand-mean centered

The final within schools model accounts for approximately 46% of the 93% variance in spring reading achievement scores that is due to within-school differences

[1] A second within-schools model was run, adding ESOL as grand-mean centered with fixed effects at level 1. Results indicated that being an ELL student did not significantly influence spring 2006 reading achievement scores independent of other variables in the model (p = .05).

(change in R= .96-.52/.96=.46). This model accounts for nearly half of the variance within schools with most of the variance being explained by prior achievement.

Final students-within-schools model, research questions 1 and 2. To model the effects of IC Teams on spring reading achievement for all students and for ELL students, ICT was added uncentered to level 2 at both the intercept (β_0) and slope (β_4). Based on the results of the within-schools model, all level 1 predictors were specified as grand-mean centered with fixed effects except for ESOL, which was added group-mean centered with the possibility of a random effect. The addition of these variables as grand-mean centered at level 1 also controls for differences within schools in the average enrollment characteristics of students (Figure 4).

Level 1 Model:

$$ZREADSS = \beta_0 + \beta_1(\boldsymbol{GRADE}) + \beta_2(\boldsymbol{GENDER}) + \beta_3(\boldsymbol{FARMS}) + \beta_4(\mathbf{ESOL}) + \beta_5(\boldsymbol{HISDIS}) + \beta_6(\boldsymbol{ZSOL0405}) + r$$

Level 2 Model:

$$\beta_0 = \gamma_{00} + \gamma_{01}(ICT) + u_0$$

$$\beta_1 = \gamma_{10}$$

$$\beta_2 = \gamma_{20}$$

$$\beta_3 = \gamma_{30}$$

$$\beta_4 = \gamma_{40} + \gamma_{41}(ICT) + u_4$$

$$\beta_5 = \gamma_{50}$$

$$\beta_6 = \gamma_{60}$$

Note. **Bold** font indicates group-mean centering; ***bold italic*** font indicates grand-mean centering.

Where:

Y_{ij} = spring 2006 SOL reading achievement score;

β_0 = intercept;

β_1 = effect of grade level on 2006 SOL reading achievement score;

β_2= effect of gender on 2006 SOL reading achievement score;

β_3=effect of free and reduced meal status (FARMS) on 2006 SOL reading achievement score;

β_4= effect of ELL student status on 2006 SOL reading achievement score;

β_5= effect of historically disadvantaged minority status on 2006 SOL reading achievement score;

β_6= effect of 2004-2005 SOL achievement scores on 2006 SOL reading achievement score;

r = error;

γ_{00} = the grand mean for the outcome across all persons and schools;

γ_{01} = the treatment effect (e.g., difference for IC Teams schools);

γ_{40} = average ELL gap;

γ_{41} = IC Teams treatment effect on slope; and

$u_{0,4}$ = level two random effects.

Figure 4. Final Students-Within-Schools Model, Research Questions 1 and 2

The results indicate that when differences between schools in student grade, gender, SES status, ELL status, historically disadvantaged minority status, and prior achievement are controlled for, the IC Team model does not significantly improve individual student reading achievement (p = .34) or for ELL student reading achievement

(p = .24).[2] This model explains 71% of the 7% of between-school variance (change in *tau* = .07-.02/.07 = .71; Table 8).

Table 8

Final Students-Within-Schools Model Results, Research Questions 1 and 2

Fixed Effects	Coefficient	Standard Error	P-Value	
ZREADSS	.02	.04	.58	
ICT	-.06	.06	.34	
ESOL	-.10	.05	.09	
ICT	.09	.08	.24	
GRADE	.19	.02	.00	
GENDER	-.13	.02	.00	
FARMS	-.05	.03	.09	
HISDIS	-.11	.03	.00	
ZSOL0405	.62	.01	.00	
Random Effects	SD	Variance	P-Value	Reliability
ZREADSS, u_0	.14	.02	.00	.84
ESOL, u_4	.09	.01	.20	.19
R	.72	.52		

Note. Bold variables are group mean centered; Bold and italicized variables are grand-mean centered

Classrooms-within-schools unconditional model for reading achievement. To determine the percentage of variance present between classes for treatment and control schools, a second unconditional model was run using classrooms instead of students at

[2] The results did not change when ZPESOL was added uncentered to the intercept and slope.

level 1. To create the fully unconditional model, no predictors were specified at the classroom or school level. In effect, the variance of the dependent variable, 2005-06 spring reading SOL score, was partitioned in terms of between-school variance and classroom variance.

Table 9

Classrooms-Within-Schools Unconditional Model Results for Reading Achievement

Fixed Effects	Coefficient	Standard Error	P-Value	
CZREADSS	.01	.12	.91	
Random Effects	SD	Variance	P-Value	Reliability
CZREADSS	.55	.30	.00	.78
R	.84	.71		

This analysis resulted in an intra-class correlation of .30 (ICC = between-classroom variance/total variance = .30/.30 + .71), meaning that approximately 30% of the variance in spring SOL scores exists between and within classrooms (Table 9).

Classrooms-within-schools model for reading achievement. Next, a within-school model was created for the outcome variable of interest (CZREADSS) by adding classroom predictors at Level 1 to model 2006 classroom spring reading achievement, and leaving Level 2 fully unconditional. All predictors were specified as controls (grand-mean centered with fixed effects), with the exception of CZPESOL, the predictor variable of interest. In order to understand how having a higher percentage of ELL students in class impacts reading achievement scores between schools, CZPESOL was specified as group-mean centered with the possibility of a random effect (Figure 5).

Level 1 Model:

$$ZREADSS = \beta_0 + \beta_1(\boldsymbol{\mathit{CZPFARMS}}) + \beta_2(\mathbf{CZPESOL}) + \beta_3(\boldsymbol{\mathit{CZPHISD}}) + \beta_4(\boldsymbol{\mathit{CZSOL05}}) + \beta_5(\boldsymbol{\mathit{CGENDER}}) + \beta_6(\boldsymbol{\mathit{CGRADE}}) + r$$

Level 2 Model:

$$\beta_0 = \gamma_{00} + u_0$$

$$\beta_1 = \gamma_{10}$$

$$\beta_2 = \gamma_{20} + u_2$$

$$\beta_3 = \gamma_{30}$$

$$\beta_4 = \gamma_{40}$$

$$\beta_5 = \gamma_{50}$$

$$\beta_6 = \gamma_{60}$$

Note. **Bold** font indicates group-mean centering; ***bold italic*** font indicates grand-mean centering.

Figure 5. Classrooms-Within-Schools Model for Reading Achievement

The within schools model indicates that grade, gender, socioeconomic status, and prior achievement scores may influence classroom spring 2006 reading achievement scores independently of other variables in the model (Table 10). Specifically, fifth grade classes and classes with higher prior achievement scores had higher spring 2006 reading achievement scores whereas classes with more males and students from lower SES backgrounds had lower spring 2006 reading achievement scores. Percentage of ELL students in a class did not appear to impact spring 2006 reading achievement scores independently of other variables in the model (p = .75). Based on chi-square tests with 27 degrees of freedom, it appears that ELL spring 2006 reading achievement scores do significantly vary between schools in this model (p = .02), as does the effect of the percentage of ELL students in the classroom (p = .00).

Table 10

Classrooms-Within-Schools Model Results for Reading Achievement

Fixed Effects	Coefficient	Standard Error	P-Value	
CZREADSS	.02	.06	.72	
CGRADE	.19	.02	.00	
CGENDER	-.13	.02	.00	
CZPFARMS	-.23	.08	.00	
CZPESOL	-.03	.09	.75	
CZPHISD	.05	.08	.52	
CZSOL05	.66	.05	.00	
Random Effects	SD	Variance	P-Value	Reliability
CZREADSS, u_0	.23	.05	.00	.58
CZPESOL, u_2	.27	.07	.02	.34
R	.56	.31		

Note. Bold variables are group mean centered; Bold and italicized variables are grand-mean centered

The within-school model accounts for approximately 56% of the 70% variance in spring reading achievement scores that is due to within-school differences (change in R = .71-.31/.71=.56). This model accounts for slightly more than half of the variance within schools.

Final classrooms-within-schools model, research questions 1 and 2. To model the effects of IC Teams on spring reading achievement for all classes and for classes with ELL students, ICT was specified as uncentered at level 2 at both the intercept (β_0) and slope (β_4). Based on the results of the within-schools model, all level 1 predictors were specified as grand-mean centered with fixed effects except for ESOL, which was specified as group-mean centered with the possibility of a random effect. The specification of these variables as grand-mean centered at level 1 controls for differences between schools in the average classroom characteristics of students. ZPESOL was also specified as uncentered at the intercept and slope to provide additional control, since CZPESOL was the only variable specified as group-mean centered at level 1 (Figure 6).

Level 1 Model:

$$\text{ZREADSS} = \beta_0 + \beta_1(\textbf{\textit{CZPFARMS}}) + \beta_2(\textbf{CZPESOL}) + \beta_3(\textbf{\textit{CZPHISD}}) + \beta_4(\textbf{\textit{CZSOL05}}) + \beta_5(\textbf{\textit{CGENDER}}) + \beta_6(\textbf{\textit{CGRADE}}) + r$$

Level 2 Model:

$$\beta_0 = \gamma_{00} + \gamma_{01}(\text{ICT}) + \gamma_{02}(\text{ZPESOL}) + u_0$$

$$\beta_1 = \gamma_{10}$$

$$\beta_2 = \gamma_{20} + \gamma_{21}(\text{ICT}) + \gamma_{22}(\text{ZPESOL}) + u_2$$

$$\beta_3 = \gamma_{30}$$

$$\beta_4 = \gamma_{40}$$

$$\beta_5 = \gamma_{50}$$

$$\beta_6 = \gamma_{60}$$

Note. **Bold** font indicates group-mean centering; ***bold italic*** font indicates grand-mean centering.

Where:

Y_{ij} = spring 2006 SOL reading achievement class average score;

β_0 = intercept;

β_1=effect of percent of free and reduced meal status (FARMS) on 2006 SOL reading achievement class average score;

β_2= effect of percent ELL student status on 2006 SOL reading achievement class average score;

β_3= effect of percent historically disadvantaged minority status on 2006 SOL reading achievement class average score;

β_4= effect of 2004-2005 SOL class average achievement scores on 2006 SOL reading achievement class average score;

β_5= effect of percent gender on 2006 SOL reading achievement class average score;

β_6 = effect of grade level on 2006 SOL reading achievement class average score;

r = error;

γ_{00} = the grand mean for the outcome across all persons and schools;

γ_{01} = the treatment effect (e.g., difference for IC Teams schools);

γ_{02} = the percent ESOL effect;

γ_{20} = average percentage ELL student gap;

γ_{21} = IC Teams treatment effect on slope;

γ_{22} = percent ESOL effect on slope; and

$u_{0,\,2}$ = level two random effects.

Figure 6. Final Classrooms-Within-Schools Model, Research Questions 1 and 2

The results of the classrooms-within-schools final model indicate that when class average grade, gender, SES status, ELL status, historically disadvantaged minority status, and prior achievement are controlled for, IC Teams significantly improves class average reading achievement for all students (p = .04), though not differentially for classes with higher percentages of ELL students (p = .98; Table 11). Specifically, IC Teams increases average class spring reading achievement scores by .36 standard deviations (ES = .36). In addition, schools with higher percentages of ELL students tended to have lower class average spring reading achievement scores (p = .02; Table 11). This model explains 87% of the 30% of between-school variance (change in *tau* = .30-.04/.30 = .87).

Table 11

Final Classrooms-Within-Schools Model Results, Research Questions 1 and 2

Fixed Effects	Coefficient	Standard Error	P-Value	
CZREADSS	-.13	.08	.12	
ICT	.36	.16	.04	
ZPESOL	-.22	.09	.02	
CZPESOL	.02	.11	.85	
ICT	.00	.20	.98	
ZPESOL	-.22	.12	.08	
CGRADE	.33	.08	.00	
CGENDER	.03	.41	.94	
CZPFARMS	-.21	.09	.03	
CZPHISD	.20	.08	.22	
CZSOL05	.67	.05	.00	
Random Effects	SD	Variance	P-Value	Reliability
CZREADSS, u_0	.19	.04	.00	.50
CZPESOL, u_2	.21	.04	.15	.26
R	.56	.31		

Note. Bold variables are group mean centered; Bold and italicized variables are grand-mean centered.

Data Analysis Procedures, Research Questions 3 and 4

Unfortunately, special education placement data from 2004-2005 was not available from the district. As a result, the models for 2006 special education placement can only provide information about whether some schools placed more students in special education, as well as correlations among variables. Without a control for 2004-2005 special education placements it is difficult to determine whether differences between treatment and control schools are due to school enrollments or the effects of IC Teams.

Students-within-schools unconditional model for special education placement. An unconditional model of the variation of spring special education placement status was created to predict variation between schools in terms of student special education placement status and school level characteristics. To create the fully unconditional model, no predictors were specified at the individual or school level. In effect, the variance of the dependent variable, 2005-06 special education status, was partitioned in terms of between-school variance and individual variance (Figure 7). Since special education placement status is a categorical dependent variable (e.g., Bernoulli distribution), generalized HLM was used, where the log odds of placement equals the following linking function: $\eta_{ij} = \log(\psi_{ij}/1- \psi_{ij})$. In this linking function, η_{ij} is the log odds of special education placement and ψ_{ij} is the probability of special education placement.

Level 1 Model:

$$\text{Prob}(SPED=1|\beta) = \varphi$$

$$\text{Log}[\varphi/(1-\varphi)] = \eta$$

$$\eta = \beta_0$$

Level 2 Model:

$$\beta_0 = \gamma_{00} + u_0$$

Note. **Bold** font indicates group-mean centering; ***bold italic*** font indicates grand-mean centering.

Figure 7. Students-Within-Schools Unconditional Model for Special Education Placement

In logistic HLM models, it is not possible to calculate the ICC. However, it is possible to directly test whether there are differences between schools in the average probability of the outcome of special education placement. In this case, the average percent special education placement is significantly different from 0, and it varies (p = .00; Table 12).

Table 12

Students-Within-Schools Unconditional Model Results for Special Education Placement

Fixed Effects	Odds Ratio	Standard Error	P-Value
SPED	.14	.05	.00
Random Effects	SD	Variance	P-Value
SPED	.20	.04	.00

Students-within-schools model for special education placement. Next, a within-school model was created for the outcome variable of interest (SPED) by adding individual student predictors at Level 1 to model 2005-2006 special education placement status, and leaving Level 2 fully unconditional. All predictors were specified as controls (grand-mean centered with fixed effects), with the exception of ESOL, the predictor variable of interest. In order to understand how being an ELL student impacts special education placement status between schools, ESOL was specified as group-mean centered with the possibility of a random effect (Figure 8).

Level 1 Model:

$$\text{Prob}(\text{SPED}=1|\beta) = \varphi$$

$$\text{Log}[\varphi/(1-\varphi)] = \eta$$

$$\eta = \beta_0 + \beta_1(\boldsymbol{GRADE}) + \beta_2(\boldsymbol{GENDER}) + \beta_3(\boldsymbol{FARMS}) + \beta_4(\mathbf{ESOL}) + \beta_5(\boldsymbol{HISDIS}) + \beta_6(\boldsymbol{ZSOL0405}) + r$$

Level 2 Model:

$$\beta_0 = \gamma_{00} + u_0$$

$$\beta_1 = \gamma_{10}$$

$$\beta_2 = \gamma_{20}$$

$$\beta_3 = \gamma_{30}$$

$$\beta_4 = \gamma_{40} + u_4$$

$$\beta_5 = \gamma_{50}$$

$$\beta_6 = \gamma_{60}$$

Note. **Bold** font indicates group-mean centering; ***bold italic*** font indicates grand-mean centering.

Figure 8. Students-Within-Schools Model for Special Education Placement

The within schools model results indicate that ELL student status, gender, socioeconomic status, historically disadvantaged minority status, and prior achievement scores are all correlated with special education placement status (Table 13). Specifically, boys and students from lower SES backgrounds had higher odds of being placed in special education, whereas ELL students, students from historically disadvantaged minority backgrounds, and students with higher 2004-2005 SOL achievement scores had lower odds of being placed in special education. Being in fifth grade versus fourth grade did not appear to impact special education placement status. In addition, based on chi-square tests with 27 degrees of freedom, it appears that ELL student special education placement status does not significantly vary between schools in this model (p = >.50).

Table 13

Students-Within-Schools Model Results for Special Education Placement

Fixed Effects	Odds Ratio	Standard Error	P-Value	
SPED	.08	.08	.00	
GRADE	.84	.10	.08	
GENDER	2.25	.10	.00	
FARMS	1.34	.12	.01	
ESOL	.67	.14	.01	
HISDIS	.68	.12	.00	
ZSOL0405	.38	.06	.00	
Random Effects	SD	Variance	P-Value	Reliability
SPED, u_0	.22	.05	.02	.40
ESOL, $\boldsymbol{u_4}$	.13	.02	>.50	.04

Note. Bold variables are group mean centered; Bold and italicized variables are grand-mean centered.

Final students-within-schools model, research questions 3 and 4. To model the effects of IC Teams on spring 2006 special education placement for all students and for ELL students, the variable for IC Teams treatment (ICT) was specified as uncentered to level 2 at both the intercept (β_0) and slope (β_4). Based on the results of the within-schools model, all level 1 predictors were specified as grand-mean centered with fixed effects except for ESOL, which was specified as group-mean centered with the possibility of a random effect. The addition of these variables as grand-mean centered at level 1 controls for differences between schools in the average classroom characteristics of students.

Level 1 Model:

$$\text{Prob}(\text{SPED}=1|\beta) = \varphi$$

$$\text{Log}[\varphi/(1- \varphi)] = \eta$$

$$\eta = \beta_0 + \beta_1(\textbf{\textit{GRADE}}) + \beta_2(\textbf{\textit{GENDER}}) + \beta_3(\textbf{\textit{FARMS}}) + \beta_4(\textbf{ESOL}) + \beta_5(\textbf{\textit{HISDIS}}) + \beta_6(\textbf{\textit{ZSOL0405}}) + r$$

Level 2 Model:

$$\beta_0 = \gamma_{00} + \gamma_{01}(\text{ICT}) + u_0$$

$$\beta_1 = \gamma_{10}$$

$$\beta_2 = \gamma_{20}$$

$$\beta_3 = \gamma_{30}$$

$$\beta_4 = \gamma_{40} + \gamma_{41}(\text{ICT}) + u_4$$

$$\beta_5 = \gamma_{50}$$

$$\beta_6 = \gamma_{60}$$

Note. **Bold** font indicates group-mean centering; ***bold italic*** font indicates grand-mean centering.

Where:

η = log odds of 2005-2006 special education placement;

β_0 = intercept;

β_1 = effect of grade level on log odds of 2005-2006 special education placement;

β_2 = effect of gender on log odds of 2005-2006 special education placement;

β_3= effect of free and reduced meal status (FARMS) on log odds of 2005-2006 special education placement;

β_4=effect of ELL student status on log odds of 2005-2006 special education placement;

β_5= effect of historically disadvantaged minority student status on log odds of 2005-2006 special education placement;

β_6= effect of 2004-2005 SOL achievement scores on log odds of 2005-2006 special education placement;

r = error;

γ_{00} = the grand mean for the outcome across all persons and schools;

γ_{01} = the treatment effect in log odds (e.g., difference for IC Teams schools);

γ_{40} = average difference in placement odds between ELL and non-ELL students (in log odds);

γ_{41} = difference between treatment and control (in logs odds); and

$u_{0,4}$ = level two random effects.

Figure 9. Final Students-Within-Schools Model, Research Questions 3 and 4

These questions could not be accurately modeled due to the lack of 2004-2005 special education placement data. However, the results indicate that when student grade, gender, SES status, ELL status, historically disadvantaged minority status, and prior achievement are controlled for, IC Teams schools did not differ from control schools in placement for students (p = .94) or ELL students (p = .85; Table 14).[3]

Table 14

Final Students-Within-Schools Model Results, Research Questions 3 and 4

Fixed Effects	Odds Ratio	Standard Error	P-Value	
SPED	.06	.09	.00	
ICT	1.01	.15	.94	
ESOL	.69	.21	.09	
ICT	.95	.27	.85	
GRADE	.84	.10	.08	
GENDER	2.25	.10	.00	
FARMS	1.34	.12	.02	
HISDIS	.68	.12	.00	
ZSOL0405	.38	.06	.00	
Random Effects	SD	Variance	P-Value	Reliability
SPED, u_0	.23	.05	.01	.42
ESOL, $\boldsymbol{u_4}$	.16	.03	>.50	.05

Note. Bold variables are group mean centered; Bold and italicized variables are grand-mean centered

[3] The results did not change when ZPESOL was added uncentered to the slope.

Classrooms-within-schools unconditional model for special education placement. To determine whether there was variance in special education placement between classrooms for treatment and control schools, a second unconditional model was run using classrooms instead of students at level 1. To create the fully unconditional model, no predictors were specified at the classroom or school level. In effect, the variance of the dependent variable, proportion of students in each classroom placed in special education, was partitioned in terms of between-school variance and between-classroom variance within schools. Results suggest that there is no statistically significant difference between schools in the average percentage of students identified as receiving special education services in 2006 ($p > .50$). The ICC is essentially zero in the fully unconditional model (Table 15); however, further analysis revealed the possibility of a suppression effect, discussed below.

Table 15

Classrooms-Within-Schools Unconditional Model Results for Special Education Placement

Fixed Effects	Coefficient	Standard Error	P-Value	
CSPED	.22	.02	.00	
Random Effects	SD	Variance	P-Value	Reliability
CSPED	.00	.00	>.50	.00
R	.32	.10		

Classrooms-within-schools model for special education placement. Next, a within-school model was created for the outcome variable of interest (CSPED) by adding class predictors at Level 1 to model 2005-2006 special education placement status, leaving Level 2 fully unconditional. All predictors were added grand-mean centered with fixed effects, with the exception of CZPESOL, the predictor variable of interest. To determine if the relationship between ELL class enrollment and percentage of special education placement status varied between schools, CZPESOL was added group-mean centered with a random effect (Figure 10).

Level 1 Model:

$$\text{CSPED} = \beta_0 + \beta_1(\boldsymbol{\mathit{CZPFARMS}}) + \beta_2(\mathbf{CZPESOL}) + \beta_3(\boldsymbol{\mathit{CZPHISD}}) + \beta_4(\boldsymbol{\mathit{CZSOL05}}) + \beta_5(\boldsymbol{\mathit{CGENDER}}) + \beta_6(\boldsymbol{\mathit{CGRADE}}) + r$$

Level 2 Model:

$$\beta_0 = \gamma_{00} + u_0$$

$$\beta_1 = \gamma_{10}$$

$$\beta_2 = \gamma_{20} + u_2$$

$$\beta_3 = \gamma_{30}$$

$$\beta_4 = \gamma_{40}$$

$$\beta_5 = \gamma_{50}$$

$$\beta_6 = \gamma_{60}$$

Note. **Bold** font indicates group-mean centering; ***bold italic*** font indicates grand-mean centering.

Figure 10. Classrooms-Within-Schools Model for Special Education Placement.

The within schools results indicates that classroom composition, in terms of ELL status, gender, socioeconomic status, historically disadvantaged minority status, and prior achievement scores, is correlated with the proportion of students placed in special education in each class (Table 16). Specifically, classes with a higher percentage of boys and students from lower SES backgrounds were more likely to have students placed in special education, whereas classes with higher percentages of ELL and historically disadvantaged minority students, as well as classes with higher prior achievement scores, were less likely to have students placed in special education. Percentage of fourth or fifth grade students in a class did not appear to impact special education placement ($p = .52$).

Based on chi-square tests with 27 degrees of freedom, it appears that the percentage of ELL students placed in special education does not vary significantly between classrooms at the .05 level ($p = .11$). However, the percentage of students in special education does vary significantly between schools after controlling for differences in average classroom characteristics ($p = .01$). These results, when compared to the fully unconditional model, suggest a possible suppression effect, whereby variability between schools in the average percentage of students receiving special education services is masked by other classroom characteristics that are correlated with the outcome and schools. In other words, when classroom enrollment characteristics are controlled for, schools significantly differ in the percentage of students receiving special education services. The final within schools model accounts for approximately 80% of the 100% variance in special education placement that is due to within-school differences (change in R= .10-.02/.10=.80).

Table 16

Classrooms-Within-Schools Model Results for Special Education Placement

Fixed Effects	Coefficient	Standard Error	P-Value	
CSPED	.16	.01	.00	
CZPFARMS	.04	.02	.05	
CZPESOL	-.06	.02	.01	
CZPHISD	-.07	.02	.00	
CZSOL05	-.15	.01	.00	
CGENDER	.60	.10	.00	
CGRADE	.01	.02	.52	
Random Effects	SD	Variance	P-Value	Reliability
CSPED, u_0	.04	.01	.01	.42
CZPESOL, u_2	.06	.04	.11	.27
R	.15	.02		

Note. Bold variables are group mean centered; Bold and italicized variables are grand-mean centered

Final classrooms-within-schools model, research questions 3 and 4. To investigate the correlation between IC Teams schools and the percentage of students in each classroom placed in special education for all classes and for classes with ELL students, ICT was added uncentered to level 2 for both the intercept (β_0) and slope (β_2) models. Based on the results of the within-school model, all level 1 predictors were specified as grand-mean centered with fixed effects except for CZPESOL, which was specified as group-mean centered with a random effect. The specification of these variables as grand-mean centered at level 1 controls for differences between schools in the average classroom characteristics of students. ZPESOL, or the percent ELL enrollment in schools, was added uncentered to the intercept and slope to provide additional controls, since CZPESOL was the only variable added group-mean centered at level 1 (Figure 11).

Level 1 Model:

CSPED = $\beta_0 + \beta_1$(***CZPFARMS***) + β_2(**CZPESOL**) + β_3(***CZPHISD***) + β_4(***CZSOL05***) + β_5(***CGENDER***) + β_6(***CGRADE***) + r

Level 2 Model:

$\beta_0 = \gamma_{00} + \gamma_{01}(\text{ICT}) + \gamma_{02}(\text{ZPESOL}) + u_0$

$\beta_1 = \gamma_{10}$

$\beta_2 = \gamma_{20} + \gamma_{21}(\text{ICT}) + \gamma_{22}(\text{ZPESOL}) + u_2$

$\beta_3 = \gamma_{30}$

$\beta_4 = \gamma_{40}$

$\beta_5 = \gamma_{50}$

$\beta_6 = \gamma_{60}$

Note. **Bold** font indicates group-mean centering; ***bold italic*** font indicates grand-mean centering.

Where:

SPED (Y_{ij}) = proportion of students in a classroom placed in special education in 2006;

β_0 = intercept;

β_1=effect of percent of free and reduced meal status (FARMS) on proportion of students in a classroom placed in special education in 2006;

β_2= effect of percent ELL student status on proportion of students in a classroom placed in special education in 2006;

β_3= effect of percent historically disadvantaged minority status on proportion of students in a classroom placed in special education in 2006;

β_4= effect of 2004-2005 SOL class average achievement scores on proportion of students in a classroom placed in special education in 2006;

β_5= effect of percent gender on proportion of students in a classroom placed in special education in 2006;

β_6 = effect of grade level on proportion of students in a classroom placed in special education in 2006;

r = error;

γ_{00} = the mean outcome for the control schools;

γ_{01} = the treatment effect (e.g., difference for IC Teams schools);

γ_{02} = the percent ESOL effect;

γ_{20} = average percentage ELL student gap;

γ_{21} = IC Teams treatment effect on slope;

γ_{22} = percent ESOL effect on slope; and

$u_{0,\,2}$ = level two random effects.

Figure 11. Final Classrooms-Within-Schools Model, Research Questions 3 and 4

The results of the classrooms-within-schools final model indicate that classrooms in IC Teams schools tended to have lower percentages of students placed in special education in general (p = .05) and, specifically, lower percentages of students placed in special education in classrooms with higher levels of ELL enrollments (*p* = .01; Table 17). Although the average ELL enrollment was not associated with the percentage of students receiving special education services in general (the intercept model), it did moderate the relationship between special education enrollments and the percentage of ELL students in classrooms (*p* = .00, the slope model). In general, classrooms with higher percentages of ELL students were also more likely to have higher percentages of special education placements in schools that enrolled higher percentages of ELL students. To summarize, the more ELL students enrolled in a school, the greater the likelihood that ELL classroom enrollments predicted special education classroom placements.

The level-1 coefficients are relatively unchanged from those reported for the previous within-schools model (with level-2 fully unconditional). Results indicate that classroom composition in terms of gender, socioeconomic status, historically disadvantaged minority status, and prior achievement scores were correlated with the percentage of students placed in special education in each class. Specifically, classes with a higher percentage of boys and students from lower SES backgrounds were more likely to have students placed in special education, whereas classes with a higher percentage of historically disadvantaged minority students, as well as classes with higher prior achievement scores, were less likely to have students placed in special education. Percentage of fourth or fifth grade students in a class did not appear to impact special education placement (*p* = .34). Based on chi-square tests with 27 degrees of freedom, it appears that there is still statistically significant variation in average classroom special education enrollments (*p* = .00), though there is no statistically significant variation in the slope for the percentage of ELL students in classrooms (*p* = >.50).

Table 17

Final Classrooms-Within-Schools Model Results, Research Questions 3 and 4

FIXED EFFECTS	Coefficient	Standard Error	P-Value	
CSPED	.19	.02	.00	
ICT	-.09	.04	.05	
ZPESOL	.00	.02	.90	
CZPESOL	-.04	.02	.08	
ICT	-.12	.04	.01	
ZPESOL	.11	.03	.00	
CZPFARMS	.07	.02	.01	
CZPHISD	-.07	.02	.00	
CZSOL05	-.16	.01	.00	
CGENDER	.59	.10	.00	
CGRADE	.02	.02	.34	
RANDOM EFFECTS	SD	Variance	P-Value	Reliability
CSPED, u_0	.05	.00	.00	.48
CZPESOL, u_2	.00	.00	>.50	.00
R	.15	.02		

Note. Bold variables are group mean centered; Bold and italicized variables are grand-mean centered

CHAPTER 5

DISCUSSION

Overview

The purpose of this study was to investigate the effect of the IC Team model on the reading achievement and special education placement of students, and ELL students in particular, while modeling the various individual, classroom-level, and school-level factors that can impact these variables. However, since prior year special education status was unavailable, it was not possible to investigate the effects of IC Teams on special education placement. Nonetheless, evaluation of reading achievement outcomes for ELL students can assess how well the IC Team model addresses the needs of ELL students, and correlations between enrollment characteristics and special education placement can provide initial information that can be used to guide future research. In this final chapter, major study results will be summarized and discussed in light of existing research. Study limitations will be considered, and directions for future research will be suggested.

Research Question 1: Reading Achievement

Students-within-schools HLM models (i.e., models that examined students nested within schools) did not find significant effects of IC Teams on the average reading achievement of students. Students in IC Teams schools had similar spring 2006 SOL reading scores compared to students in control schools, after controlling for differences between schools in the grade level of students, gender enrollment, average SES status, average ELL status, average historically disadvantaged minority status, and average prior achievement. This finding may be due to the study limitations described below. It is also possible that IC Teams had the effect of equalizing achievement test scores between treatment and control schools who differed in terms of prior achievement. However, successful statistical control for enrollment and prior achievement differences between schools in the present study may also explain this finding. Future studies with additional data are needed to determine if either of these interpretations for the lack of significance is accurate.

Classrooms-within-schools multilevel models (i.e., models that examined classes nested within schools) indicated that classrooms in IC Teams schools had significantly higher class average reading achievement test scores (ES = .36) compared to classrooms in control schools, after controlling for differences between schools in the grade level of classes, gender enrollment of classes, average SES status of classes, average ELL status of classes, average historically disadvantaged minority status of classes, and average prior achievement of classes. This effect size of .36 indicates that IC Teams had a "moderate" treatment effect on class average reading achievement test scores (Cohen, 1988). The finding that average classroom test scores significantly differed between schools but average individual student scores did not was unexpected, since schools, and not classrooms, were assigned to the IC Teams "treatment" condition. Nonetheless, it is quite possible that classroom effects more directly capture the benefits attributable to teacher support from the IC Team than individual student effects. The finding that implementing IC Teams improved average class reading achievement scores by more than a quarter of a standard deviation supports study hypotheses and previously reported descriptive data on the effects of IC Teams (e.g., Gravois & Rosenfield, 2002).

These results suggest that IC Teams may have its greatest impact at the classroom level, perhaps reflecting its emphasis on improving teacher as well as student performance. The data used in the present study did not indicate which teachers had made a voluntary request for IC Teams assistance, so it was not possible to explore individual student reading achievement scores in classrooms where teachers had requested assistance compared to classrooms where teachers had not requested assistance (e.g., students-within-classrooms). In general, the finding that classrooms in IC Teams schools had higher average reading achievement scores compared to classrooms in non-IC Teams schools suggests that future research should focus on investigating IC Teams at the classroom, as well as school, level.

Another possibility is that the IC Teams schools in this study, which were only in their second or third year of IC Teams implementation, had not yet institutionalized IC Teams enough to create school level change. It is likely that despite strong level of implementation (LOI) scores in 10 out of 11 IC Teams schools, only a subset of teachers in each school used IC Teams, since the LOI scores do not take into account how many teachers request assistance from the IC Team. According to the IC Teams Facilitator Training Manual (Vail, Gravois, & Rosenfield, 2001), the IC Team must become part of the school culture for institutionalization to occur, and this developmental process takes time. It would be interesting to see whether a students-within-schools HLM analysis would in fact indicate significant differences in individual student reading achievement scores in a couple of years, once institutionalization has presumably had a chance to occur.

Research Question 2: ELL Reading Achievement

Neither the students-within-schools nor classrooms-within-schools HLM models found IC Teams to differentially influence reading achievement for ELL students.

However, there were also no significant effects on the slopes of these models, seemingly indicating that IC Teams are equally effective for ELL and non-ELL students. This finding may exist because the power to find a slope effect (e.g., whether the IC Team model is more effective for non-ELL students compared to ELL students) is lower than the power to find an intercept effect (e.g., whether the IC Team model differentially influences reading achievement for ELL students). In the present study, there were substantial differences in the reliability of the parameters being modeled. Specifically, the reliabilities of the intercepts were higher (.84 for students-within-schools and .50 for classrooms-within-schools) compared to the reliabilities of the slopes (.19 for students-within-schools and .26 for classrooms-within-schools).

It also remains unknown whether teachers requested IC Teams assistance for concerns with their ELL students; perhaps IC Teams should increase teacher awareness about their availability to support teachers who have concerns about this population. Another possibility is that the instructional interventions and approaches currently offered to teachers by the IC Team are necessary but not sufficient for improving ELL reading achievement. For example, IC Teams in the study schools may not have been aware of or trained on the relatively recent experimental literature on effective reading interventions for ELL students (e.g., Sáenz, Fuchs, & Fuchs, 2005; Tam, Heward & Heng, 2006; Vaughn et al. 2006a, 2006b, 2006c) or effective instructional approaches (e.g., August & Shanahan, 2006; Echevarria, Vogt, & Short, 2004; Gersten & Baker, 2000). Future team development activities should incorporate this knowledge into the instructional repertoire.

In addition to the study limitations detailed below, it is also possible that the reading SOL achievement tests used as an outcome measure were not sensitive enough to document ELL student reading achievement. The presence of the IC Team may have influenced ELL reading achievement without indicating such a change on the reading SOL test, which primarily measures reading comprehension. For example, if a teacher requested assistance for an ELL student with reading concerns and instructional assessment revealed that the student did not know all of his or her letter sounds, the focus of the IC problem-solving process might have been to increase this discrete skill. A tendency to focus on discrete skill improvement at the expense of global reading comprehension and teacher classroom instruction may be particularly true for novice instructional consultants, since the latter requires a higher level of consultant skill and experience. Future studies of ELL reading achievement should therefore examine in more detail the specific concerns of ELL students who were served by the IC Teams to ensure that skill instruction was embedded in context. English language skills may be particularly important for reading comprehension in the intermediate grades, where task demands often require more than just good decoding and sight word skills.

In addition, the IC Team model was not available to the participating fourth and fifth grade ELL students in the earlier grades, when collaborative problem-solving might have been particularly helpful. For example, Ochoa, Robles-Piña, Garcia, and Breunig (1996) found that ELL students are typically referred to special education with reading and behavioral concerns in the early elementary grades. The Kindergarten, first grade, and second grade teachers of the ELL students in the present study did not have access to an IC Team for support in addressing reading concerns, since the IC Teams had not been in their schools for long enough. Future studies might evaluate the impact of the IC Team model on ELL reading achievement in schools that had an IC Team for a longer period of time.

Another concern about using the reading SOLs with ELL students, relevant to their lack of sensitivity to gains, is that they were given at each student's grade level, and not instructional level (D. Hankins, ESOL Dual Language Assessment Specialist, personal communication, May, 2007). Since the IC process emphasizes an instructional match and monitors progress using instructional-level reading materials (93-97% known words), it is possible that the reading SOLs were at ELL students' frustration levels, and therefore unable to accurately measure their level of reading comprehension. Although the reading SOLs are important to consider given their status as state-mandated measures of adequate yearly progress, future research should also include additional standardized reading comprehension measures that are given at students' instructional level (e.g., Developmental Reading Assessment).

Research Questions 3 and 4: Special Education Placement

Unfortunately, it was not possible to investigate the specific impact of IC Teams on special education placement due to the lack of 2004-2005 special education placement data. Instead, correlations between variables were explored in students-within-schools and classrooms-within-schools models. The students-within-schools final model results indicate that there were no differences between schools in terms of the average probability of special education placement when differences between schools in grade-levels of students, gender enrollments, average SES status, average ELL status, average historically disadvantaged minority status, and average prior achievement are controlled for. At the individual level, being a boy and coming from a lower SES background were correlated with increased chances of special education placement, whereas having higher prior achievement scores and, unexpectedly, coming from a historically disadvantaged minority background were correlated with decreased chances of special education placement.

The classrooms-within-schools results indicate that, after controlling for differences between schools in terms of the student characteristics of classrooms, classrooms in general and classrooms with higher percentages of ELL students tended to have lower percentages of students placed in special education in IC Teams schools. These results provide initial support for study hypotheses. Although the experimental design used precludes statements about causality, the correlations are in the expected direction. Specifically, the IC Team model may hold promise in terms of addressing academic concerns in the general education classroom, without the need for special education referral for non-disabled students. However, other reasons for a decrease in special education referrals not investigated by the present study may also exist, such as teachers seeing the IC Team as an obstacle to making special education referrals.

Implications

Study results suggest that during the first two to three years of implementation, the IC Team model may have its greatest impact on teacher, as opposed to student, improvement. Significant differences in reading achievement scores were found only in the classrooms-within-schools model. This finding suggests that teachers who had access to the IC Team may have been able to create effective instructional environments, translating into significant reading achievement gains for their students with the lowest test scores and, therefore, higher class average test scores. Similarly, the classrooms-within-schools model of special education placement yielded significant differences at the classroom, and not individual student, level. Classrooms housed in IC Teams schools tended to have lower percentages of special education students, a finding which calls for more rigorous experimental study of the impact of the IC Team model on classroom special education placement averages.

The presence of significant effects at the classroom level may also indicate that the classroom is a better unit of analysis for investigating the effectiveness of the IC Team model. Even though schools are assigned to implement IC Teams, IC Team members work one-on-one with teachers, and not individual students. Therefore, treatment effects are more likely to be detected at the classroom level, since teachers are the primary recipients of treatment. In the present study, treating all of the students equally in the students-within-schools model may have obscured individual student effects for those whose teachers did access the IC Team.

In addition, teacher effects may have been obscured in the students-within-schools models, since some classrooms were larger than others. In contrast, each teacher counted equally in the classrooms-within-schools models. When specifying students-within-schools models, assumptions about classroom-level effects were made based on individual student data, which may have constituted an atomistic fallacy (e.g., Diez Roux, 2002). Specifically, inferences about the classroom level were made based on data collected at the individual student level. Despite this fallacy, the educational literature continues to focus on individual students rather than to conduct studies using the classroom as the unit of analysis.

Finally, the IC Team model did not appear to improve class average reading achievement test scores for classrooms with higher percentages of ELL students. The reasons behind this finding, which could include measurement techniques that are insensitive to ELL academic development and underdeveloped IC Team strategies for addressing teacher concerns about this population, call for additional investigation.

Limitations

Perhaps the most notable set of limitations are related to the use of a quasi-experimental design and archival data not gathered specifically for the purposes of addressing the research questions in this study. A quasi-experimental design consisting of an untreated control group with dependent predictor and outcome variables was used to investigate the first two research questions relating to reading achievement (Shadish, Cook, & Campbell, 2002). Compared to randomized trials, the major weakness of a quasi-experimental nonequivalent comparison group design is a selection threat to internal validity. Since the treatment and control groups were not created to be probabilistically similar, it is difficult to know whether the observed outcomes are due to IC Teams or some unmeasured prior existing difference among the groups.

In the present study, an ANOVA of student demographic variables indicated significant differences between IC Teams and control schools. These differences were controlled for in the HLM analyses, but statistical controls may not have captured all the differences. As a result, it is unclear how reliable study findings are. Randomized assignment of schools to control or treatment conditions would have been ideal in terms of ruling out selection threats. In addition, the lack of prior year special education placement data made it impossible to determine the impact of IC Teams on special education placement.

In terms of archival data use, the researcher had to assume that the data provided were accurate and representative of all of the cases in the schools examined. In cases of missing data, no explanations were provided, which could indicate a selection bias. Proficiency levels of ELL students were unknown in the current sample, and decisions in terms of which ELL students took the SOLs were not documented. The number of students newly identified as needing special education in 2005-2006 also remained unknown. These pieces of missing information might have provided additional insight into the results of the present study. In addition, ELL students had to be defined as those who qualified for ESL services and were either receiving direct or monitor service. Although the present data included as ELL students those who were identified as needing ESL services but whose parents refused service, it is possible that other existing ELL cases were not documented because, for example, the student had exited ESL monitor status.

Finally, data on which teachers accessed the IC Team were not provided, so analysis of students-within-classrooms was not possible. The higher percentage of variance between classrooms compared to between schools indicated a need for additional study in this area, ideally with a three-level HLM model. However, the sample size of the present study was not large enough for a three-level HLM model of students-within-classrooms-within-schools.

Future Directions for Research

The next step in the current line of research would be to randomly assign schools to IC Teams "treatment" or "control" conditions. More schools should be included in the study, so that a three level HLM model (students-within-classrooms-within schools) can be specified. In addition, information on which teachers received assistance from the IC Team will result in the ability to analyze the effects of IC Teams on students whose teachers have gone through the IC problem-solving process. Future data collection efforts should also carefully document the reasons for missing data, as well as the decision process in terms of which students participate in outcome measures of interest. Finally, to investigate questions of causality, appropriate prior year controls for the outcomes of interest will have to be collected. In the present study, lack of information about prior year special education placement status precluded the investigation of IC Teams' effects on special education placement.

When studying the impact of IC Teams on ELL student reading achievement, assessments that measure variables other than reading comprehension might yield results that are more sensitive to the progress made by these students (e.g., phonics, word study, decoding, vocabulary, and oral language skills). Ideally, more than one reading outcome measure would be available, and students would be assessed at their instructional level to provide the most accurate measures of their reading ability. Data should also be collected over a period of more than two years, to allow for both the institutionalization of IC Teams to occur within schools and the development of advanced consultation skills.

Finally, future research on the process and outcomes of service delivery to ELL students could help identify best practice in addressing at-risk students. Factors such as coordination of services, establishment of goals, and assessment of progress should be documented. Silva, Hook, and Sheppard's (2005) project on supporting the instructional environments of at-risk ELLs should be further evaluated to determine if these strategies are useful in supporting the academic needs of ELLs in general education and ESL classrooms. A qualitative study could assist in identifying current instructional environments for ELL students, including teacher selection of interventions and instructional approaches, and the process used by problem-solving teams when addressing ELL student concerns. IC Teams and other problem-solving intervention teams should also incorporate research-based ELL reading interventions, and raise teacher awareness about the team's ability to address ELL student concerns. Research on effective interventions for ELLs, particularly within an RtI model, should also continue, to ensure that these children are appropriately and equitably served within public schools.

Conclusions

The present study represents a contribution in terms of tackling the experimental problem of studying the IC Team model, which impacts students who are nested within classrooms and schools with differing enrollment characteristics. Despite the limitations presented, this study represents the most rigorous investigation of the effect of IC Teams on student reading achievement to date, and is one of only two studies investigating the effects of IC Teams on ELL student outcomes. The results of the present study serve as a foundation for future research using HLM to investigate the effects of the IC Team model on student and classroom outcomes.

APPENDIX A: Additional Variable Descriptive Information

Student-level Dependent Variables	*n (N = 5942)*	Decision
ZREADSS	5177 (437 ELL students do not have scores; 821 ELL students do have scores)	No transformation needed.
SPED	5942 (5202 not special ed; 740 special ed)	Categorical variable. 1 = Identified as needing special education; 0 = not identified as needing special education

Student-level Predictors	*n (N = 5819)*	Decision
ZSOL0405	4731	No transformation needed. Cronbach's alpha = 0.875.
ESOL	5942 (1258 ESOL identified; 4684 not ESOL identified)	Categorical variable. 1 = Identified as needing ESOL services
FARMS	5940 (2031 received FARMS; 3909 did not)	Categorical variable. 1 = received FARMS
HISDIS	5942 (3206 yes; 2736 no)	Categorical variable. 1 = American Indian, African American, Hispanic, Hawaiian, unspecified; 0 = Asian and Caucasian
GENDER	5942 (3134 male; 2808 female)	1 = male; 0 = not male (female)
GRADE	5942 (2973 4th graders; 2969 5th graders)	Categorical variable; 1 = fifth grade; 0 = not fifth grade (fourth grade)

Classroom-level Dependent Variables	*n (N = 270)*	Decision
CSPED	270	No transformation needed
CZREADSS	251	No transformation needed
Classroom-level Predictors	***N = 270***	**Decision**
TeachID	270	No transformation needed
CZPFARMS	270	No transformation needed
CZPESOL	270	No transformation needed
CZPHISD	270	No transformation needed
CZSOL05	249	No transformation needed
CGENDER	270	No transformation needed
CGRADE	270	No transformation needed
School-Level Predictors	***N* = 28**	**Decision**
ZPESOL	28	No transformation needed.
ICT	28	Categorical variable.
	(11 had IC Teams; 17 did not)	1 = school had implemented IC Teams; 0 = school had not implemented IC Teams

APPENDIX B: Variable Descriptive Statistics

Student Variables	*N*	Mean	SD	Minimum	Maximum
GRADE	5942	.50	.50	.00	1.00
GENDER	5942	.53	.50	.00	1.00
FARMS	5940	.34	.47	.00	1.00
ESOL	5942	.21	.41	.00	1.00
HISDIS	5942	.54	.50	.00	1.00
ZSOL0405	4731	.00	1.00	-3.36	1.63
ZREADSS	5177	.00	1.00	-3.49	1.75
Classroom Variables	*N*	Mean	SD	Minimum	Maximum
CZPFARMS	270	.00	1.00	-1.35	2.40
CZPESOL	270	.00	1.00	-0.98	3.90
CZPHISD	270	.00	1.00	-2.07	1.73
CSPED	270	.22	.32	.00	1.00
CZSOL05	249	.00	1.00	-4.85	1.97
CZREADSS	251	.00	1.00	-4.71	1.88
CGENDER	270	.54	.14	.00	1.00
CGRADE	270	.50	.48	.00	1.00
School Variables	*N*	Mean	SD	Minimum	Maximum
ICT	28	.39	.00	.00	1.00
ZPESOL	28	.00	1.00	-1.35	2.13

APPENDIX C: Correlations among Student-Level Variables

Student Variables	GRADE	GENDER	FARM	ESOL	HISDIS	SPED	ZSOL0405	ZREADSS
GRADE	1.00	.00	.00	-.04*	.02	.00	.04*	.11*
GENDER	.00	1.00	-.01	.01	.01	.11*	.02	-.06*
FARMS	.00	-.01	1.00	.39*	.42*	.09*	-.28*	-.24*
ESOL	-.04*	.01	.39*	1.00	.35*	.00	-.24*	-.18*
HISDIS	.02	.01	.42*	.35*	1.00	.05*	-.31*	-.27*
SPED	.00	.11*	.09*	.00	.05*	1.00	-.26*	-.24*
ZSOL0405	.04*	.02	-.28*	-.24*	-.31*	-.26*	1.00	.65*
ZREADSS	.11*	-.06*	-.24*	-.18*	-.27*	-.24*	.65*	1.00

**Correlation is significant at the 0.01 level (2-tailed)*

APPENDIX D: Multicollinearity for Reading Achievement as Outcome Variable

Student Variables	Zero Order	Partial	VIF
GRADE	.12	.13	1.00
GENDER	-.05	-.09	1.00
FARMS	-.23	-.04	1.35
ESOL	-.18	-.04	1.21
HISDIS	-.26	-.08	1.32
ZSOL0405	.65	.62	1.12

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